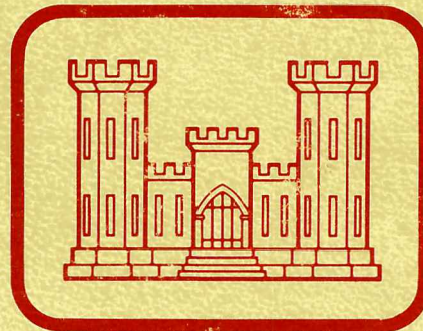


FORT A.P. HILL, VIRGINIA

TERRAIN ANALYSIS



PREPARED BY
MICHAEL BAKER, JR., INC.
JACKSON, MISSISSIPPI

UNDER THE DIRECTION OF
THE TERRAIN ANALYSIS CENTER
U.S. ARMY ENGINEER TOPOGRAPHIC LABORATORIES
FORT BELVOIR, VIRGINIA 22060

JANUARY 1979

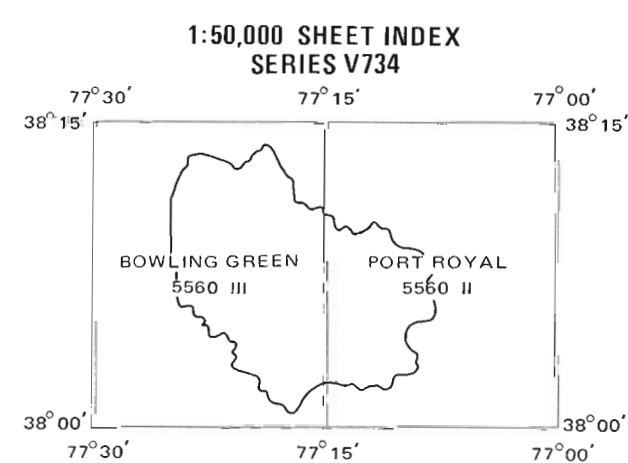
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FORT A.P. HILL, VIRGINIA

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CONTRACT NUMBER DACA87-78-C-0131

JANUARY 1979

I. INTRODUCTION

BACKGROUND

The requirement for this terrain analysis of Fort A. P. Hill was validated by the Assistant Chief of Staff for Intelligence, Department of Army, included in the five-year Terrain Analysis Program, and assigned as part of the program element, "Terrain Analysis of Selected CONUS Army Installations." Responsibility for management and supervision of this program element developed in response to FORSCOM and TRADOC requirements, was assigned to the Terrain Analysis Center (TAC), U.S. Army Engineer Topographic Laboratories. TAC responsibility also includes technical supervision and direction of designated troop units assigned to the program.

Scope and content of the topical coverage included in the terrain analysis of selected CONUS installations were developed jointly between representatives of TAC and FORSCOM, and later concurred in by TRADOC.

This study was prepared by Michael Baker, Jr., Inc., Jackson, Mississippi, (Contract No. DACA 87-78-C-0131) under the direction of TAC.

PURPOSE

The major purpose of the program is to assist military planners in future stationing decisions. To achieve this purpose, planners must obtain an appreciation of the on-post terrain that includes among many other things, knowledge of the suitability for conducting field training exercises involving maneuverability of troops and military vehicles. The degree of maneuverability that can be achieved is a function of several terrain factors including slope, surface configuration, soils, vegetative cover, and surface drainage, all of which are treated in the studies.

Planners concerned with troop stationing also need certain off-post information such as statistics on housing, schools, hospitals, and public utilities in urban areas near installations, as well as pertinent data on airfields and ports in the vicinity. These things are also treated in the studies.

Since the program under which this study was prepared is intended to serve troop stationing requirements, the support provided by the program to environmental requirements is only incidental. While some of the information contained in the studies may be useful as environmental base line data, the studies are by no means complete environmental inventories of the kind required in support of environmental impact assessments.

SCOPE

In scope, the terrain analysis is a compendium of available data on the pertinent natural and man-made features of the reservation and an evaluation of their effects on tactical military operations. The program does not include basic research to fill gaps in these data although some short-term field investigations were performed to obtain ground truth and a general overall appreciation of terrain elements. Therefore, the scope of the analysis is limited primarily to those factors which have been documented by other authorities and to the results of analysis and evaluation of those factors by project technical specialists for topics such as cross-country movement, cover and concealment, and water resources.

The terrain analysis preparation process has necessarily involved analytical judgement in the selection of pertinent source data, resolution of data conflicts, recognition of interrelationships not previously made explicit, and the application of remote sensing to update certain critical, time-variant data such as vegetative cover and man-made features including roads, airfields, and facilities constructed outside of the cantonment areas.

LIMITATIONS

The study naturally reflects limitations in the quality, amount, and currency of the source data on which it is based. Numerous field interviews and selective use of remote sensing were employed in an effort to assure presentation of the latest and best information. Within the relatively complex topical scope of the analysis, however, there are a number of aspects on which source data have not been generated with the focus or recency desired to meet objectives fully. As noted under Scope, the study effort was not designed to include basic research as a means of filling gaps in data.

By design, the presentation is cast at a level of data coverage consistent with stated objectives. Users interested in deeper pursuit of data are referred to the List of Sources included as the last page of the study.

PRESENTATION

Maximum use of graphic presentation has been made throughout the terrain analysis. Supporting text is, as far as practicable, in tabular format keyed to the related graphics which follow. The primary map scale is 1:50,000. For Urban Areas (Cantonment Areas), larger scale maps are used, and for Off-Post Features the map scale is 1: 1,000,000.

STUDY AREA

The Fort A. P. Hill military reservation is in Caroline County, Virginia, approximately 32 kilometers (20 miles) south of Fredericksburg and 64 kilometers (40 miles) north of Richmond. The reservation extends about 24 kilometers (15 miles) north-south and 21 kilometers (13 miles) east-west at its widest point, and covers an area of approximately 312 square kilometers (77,000 acres). The main entrance to Fort A. P. Hill is reached from U.S. Route 301, which crosses the center of the reservation in a northeast-southwest direction. Much of the northeast boundary is along U.S. Route 17 and about half the western boundary is along State Route 2. Interstate 95 and U.S. Route 1 are easily accessible to the west.

The Fort A. P. Hill military reservation lies within the Atlantic Coastal Plain physiographic province, a nearly level to moderately rolling plain, dissected by small streams with steep side slopes. The highest elevation is 78 meters (255 feet) on a ridge northwest of the drop zone near the west boundary of the reservation. The lowest elevation is 3 meters (10 feet) at Miller's Pond in the extreme northeast part of the reservation. Most streams are perennial, originate on the reservation, and flow into the Mattaponi River to the west, or the Rappahannock River to the east. Beaver activity and swamps are common in stream bottoms throughout the reservation.

Climate in the area is modified continental, with mild winters and warm humid summers. Temperatures range from an average high of 32° C (89° F) in July to an average low of -5° C (24° F) in January. Precipitation is well distributed throughout the year, with the maximum in August, the minimum in February, and an annual average of 1018 millimeters (40 inches). Vegetation varies from wetland along streams to managed pine forest on higher slopes and uplands.

II. DESCRIPTION AND MILITARY ASPECTS OF TERRAIN

A. SURFACE CONFIGURATION

Fort A. P. Hill is located within the Atlantic Coastal Plain physiographic province in the northeastern portion of Caroline County, Virginia. The post is on a nearly level to moderately rolling plain, dissected by small streams with steep side slopes. Drainage is eastward to the Rappahannock River and westward to the Mattaponi River. Surface slopes generally range from 0 to 30 percent; elevations range from a low of 3 meters (10 feet) to a high of 78 meters (255 feet); and interstream areas generally range from 6 to 46 meters (20 to 150 feet) above adjacent stream valley bottoms.

| LANDFORM TYPE | LANDFORM DESCRIPTION AND DISTRIBUTION | ELEVATION |
|---------------|---|--|
| LOW PLAINS | Predominantly level to gently rolling plains; some moderately rolling plains. Nearly level to gently rolling plains, dissected by small streams, extend entirely across the post from the northwest to the southeast. The more level plains are located within the drop zone in the northwest, Archer Camp and Post Headquarters in the central, and the impact area in the southeast portions of the post. Interstream areas range between 6 and 18 m (20 and 60 ft) above adjacent stream valley bottoms. Slopes are generally between 0 and 8%. The moderately rolling plains occur throughout the post where streams have dissected the uplands, the steeper stream incisement slopes being located in the northeast portion. Interstream areas range between 9 and 46 m (30 and 150 ft) above adjacent stream valley bottoms. Slopes are generally between 8 and 30%. In a few steeper valleys, slopes range between 30 and 50%. | Mostly between 30 and 70 m (100 and 230 ft) above mean sea level. The lowest elevation, 3 m (10 ft), is at Millers Pond (grid reference 092240). The highest elevation, 78 m (255 ft), is northwest of the drop zone near the west boundary of the post (grid reference 904273). |

B. SURFACE DRAINAGE

Fort A. P. Hill is in the drainage basins of the Mattaponi and the Rappahannock Rivers. Stream channels in the southern and western portions of the post flow into the Mattaponi River, while those in the northern and eastern portions flow into the Rappahannock River.

Most streams on Fort A. P. Hill are perennial and average 3 meters (10 feet) in width and 0.3 meters (1 foot) in depth at normal flow. Flooding is a minor problem and of short duration; usually after a short rainfall of high intensity.

Beaver activity is common along most streams. This results in numerous beaver-dammed ponds and also contributes to the flooding of low areas. The beaver ponds, which are not controlled by management, are featured on the Drainage Map but are unnamed.

Swamps with over 50 percent trees are common in stream bottoms throughout the reservation. Some low-lying, nearly flat, floodplains and river terraces may contain water periodically for several months in the winter. There are no stream fords on the post; crossing areas are limited to culverts and bridges.

Water surfaces may freeze for short periods during January and February; maximum ice thickness about 0.15 meters (0.5 feet).

No specific published data are available on the streams on Fort A. P. Hill. Information for this topic was obtained from personnel familiar with the post, aerial photography, U.S. Geological Survey quadrangle maps and field reconnaissance. Estimated discharges were figured by the Manning's Equation and the U.S. Geological Survey Method.

DRAINAGE CHARACTERISTICS

| DRAINAGE CATEGORIES | GENERAL | REGIME | WIDTH | DEPTHS | VELOCITY & DISCHARGE | BANKS | BOTTOMS |
|--|--|---|---|---|---|--|--|
| WATERCOURSES | | | | | | | |
| MATTAPONI RIVER DRAINAGE AREA | | | | | | | |
| Smoots Run and Beverly Run | Perennial streams flowing southward through narrow valleys with gently sloping valley walls. Bands of swamps often adjacent to stream channels. Both creeks drain the southern section of the post and have watersheds of approximately 22 km ² (8.5 mi ²) and 33 km ² (12.7 mi ²) respectively. Smoots Run is the major source of Smoots Pond and Beverly Run is the major source of White Lake. | Some high water November through April, gradually receding to August through September, the low water period. Water flow is maintained by springs. Infrequent flooding occurs from November through April and usually lasts only a few hours. | Varies from about 1.5 to 5 m (5 to 16 ft) in normal water. | About 0.3 m (1 ft) at normal water; maximum of about 1.5 m (5 ft) during highest water periods November through April. | Average velocity is estimated at about 0.3 m/sec (1 ft/sec) and mean annual discharge at about 1.4 m ³ /sec (48 ft ³ /sec) for each stream. | Mostly clay or sandy clay. Generally 1.5 to 2 m (5 to 7 ft) high and steep, with 50% to 70% slope. | Mostly clay or sandy clay with organic material. Gradients generally less than 0.5%. |
| Cattlet Creek, Maracossia Creek, Meadow Creek and Turkey Creek | Perennial streams flowing generally southward through narrow valleys with gently sloping valley walls. Bands of swamps often adjacent to stream channels. Cattlet and Turkey Creeks drain approximately 30 km ² (11.6 mi ²) of the southwestern area of the post. Maracossia Creek drains approximately 13 km ² (5.0 mi ²) of the southwestern area of the post and Meadow Creek drains approximately 13 km ² (5.0 mi ²) of the post. | Some high water November through April, gradually receding to August through September, the low water period. Water flow is maintained by springs. Infrequent flooding occurs from November through April and usually lasts only a few hours. | Varies from about 1 to 3 m (3.3 to 10 ft) in normal water. Channels are subject to scour and siltation. | Approximately 0.3 m (1 ft) at normal water and a maximum of about 1.5 m (5 ft) during highest water periods November through April. | Average velocity is estimated at about 0.3 m/sec (1 ft/sec) and mean annual discharge at about 1.0 m ³ /sec (35 ft ³ /sec) for each stream. | Mostly clay or sandy clay. Generally 1.5 to 2 m (5 to 7 ft) high and steep, with 50% to 70% slope. | Mostly clay or sandy clay with organic material in some areas. Gradients generally less than 0.5%. |
| RAPPAHANNOCK RIVER DRAINAGE AREA | | | | | | | |
| Mill Creek, Mount Creek and Portabago Creek | Perennial streams flowing generally eastward and northeastward through narrow valleys with gentle to moderately sloping valley walls. Bands of swamps and wet lands often adjacent to stream channels. Mill Creek drains approximately 79 km ² (30.4 mi ²) of the central section of the post, Mount Creek drains approximately 33 km ² (12.7 mi ²) of the northern section of the post and Portabago Creek drains approximately 28 km ² (10.8 mi ²) of the southeast perimeter of the post. | Some high water November through April, gradually receding to August through September, the low water period. Water flow is maintained by springs. Infrequent flooding occurs from November through April and usually lasts only a few hours. | Varies from 2 to 5 m (7 to 16 ft) in normal water. Channels are subject to scour and siltation. | Approximately 0.3 m (1 ft) at normal water and a maximum of about 2.2 m (7 ft) during highest water periods November through April. | Average velocity is estimated at about 0.3 m/sec (1 ft/sec) and mean annual discharge at about 1.6 m ³ /sec (56 ft ³ /sec) for each stream. | Mostly clay or sandy clay. Generally 1.8 to 2 m (6 to 7 ft) high and steep, with 50% to 70% slope. | Mostly clay or sandy clay with organic material in some areas and localized area of gravel in Mount Creek. Gradients generally less than 0.5%. |
| Goldenvale Creek, Peumansend Creek, Tobacco Creek and Ware Creek | Perennial streams flowing generally northeastward through narrow valleys with gentle to moderately sloping valley walls. Bands of swamps and wet lands often adjacent to stream channels. Goldenvale Creek drains approximately 37 km ² (14.3 mi ²) of the northeast section of the post, Peumansend Creek drains approximately 28 km ² (10.8 mi ²) into Mill Creek, Tobacco Creek drains approximately 28 km ² (10.8 mi ²) of the east perimeter of the post and Ware Creek drains approximately 13 km ² (5.0 mi ²) of the northern edge of the post. | Some high water November through April, gradually receding to August through September, the low water period. Water flow is maintained by springs. Infrequent flooding occurs from November through April and usually lasts only a few hours. | Varies from 1 to 3 m (3.3 to 10 ft) in normal water. Channels are subject to scour and siltation. | Approximately 0.3 m (1 ft) at normal water and a maximum of about 1.5 m (5 ft) during highest water periods November through April. | Average velocity is estimated at about 0.3 m/sec (1 ft/sec) and mean annual discharge at about 1.0 m ³ /sec (35 ft ³ /sec) for each stream. | Mostly clay or sandy clay. Generally 0.9 to 1.5 m (3 to 5 ft) high and steep, with 50% to 70% slope. | Mostly clay or sandy clay with organic material in some areas. Gradients generally less than 0.5%. |

B. SURFACE DRAINAGE (Continued)

DRAINAGE CHARACTERISTICS (Continued)

| DRAINAGE CATEGORIES | GENERAL | REGIME | WIDTH | DEPTHS | VELOCITY & DISCHARGE | BANKS | BOTTOMS |
|---|---|---|---|---|---|--|---|
| Other Streams (includes both drainage areas) | Mostly perennial streams forming the tributaries of the major drainages of the post. They generally flow through narrow valleys with gently to moderately sloping valley walls. | Some high water November through April generally after thunderstorms and of short duration. Flow is maintained in most streams in the low water period, August through September, by springs. | Generally narrow channels of less than 1 m (3.3 ft) in normal water. | Most streams approximately 1.2 m (4 ft) for short periods of high water in late winter and early spring, declining to less than 0.3 m (1 ft) in late summer and early fall. | Average velocity is estimated at about 0.3 m/sec (1 ft/sec) and mean annual discharge at less than 1.0 m ³ /sec (35 ft ³ /sec). | Mostly clay or sandy clay. Generally 0.9 to 1.5 m (3 to 5 ft) high and steep, with 50% to 70% slope. | Mostly clay or sandy clay with organic material and gravel in localized areas. Gradients of tributaries generally less than 1%; may reach 2% or more near headwaters. |
| STANDING BODIES OF WATER | | | | | | | |
| (See Reservoirs and Ponds table below) | | | | | | | |
| WET AREAS | | | | | | | |
| Swamps | Mostly perennial swamps containing more than 50% trees and shrubs located in stream bottoms throughout the reservation. Beaver dams contribute to the size of the wet areas. | Subject to flooding during high water period, November through April; flooding receding to low water period, August through September. | Areas vary from a few square meters to several square kilometers; dimensions will vary during the high/low-water periods. | Generally less than 0.3 m (1 ft), but depth varies considerably with high/low-water periods of adjacent streams. | Water movement is generally imperceptible and discharge is seldom measurable. | Wet areas usually merge gradually into higher terrain. | Layers of organic material on top of mostly silty sand or clay. |

RESERVOIRS AND PONDS

| MAP NUMBER | NAME | GRID REFERENCE | RESERVOIRS AND PONDS | | | | | | | DAMS ¹ | | | | | | | REMARKS | | |
|------------|--------------------------------|----------------|-------------------------|-----|-------------------|------|------------------------------------|-------|----------------------|--------------------------|-------|------------------------|-------|------------------|------|------------------------------|---------|-----------------------------|---|
| | | | AVERAGE DEPTH m (ft) | | AREA ha (acre) | | ESTIMATED VOLUME ha m (acre ft) | | PURPOSE ³ | OVERALL LENGTH m (ft) | | WATER LENGTH m (ft) | | HEIGHT m (ft) | | HEIGHT ABOVE WATER m (ft) | | CLASSIFICATION ⁴ | |
| W 1 | Beaver Dam Pond | 955176 | 1.5 | (5) | 3.6 | (9) | 5.6 | (45) | | W | 198 | (648) | 173 | (566) | 4.9 | (16) | 1.2 | (4) | A |
| W 2 | Bowies Pond ² | 913189 | 1.5 | (5) | 8.5 | (21) | 13.0 | (105) | W | 252 | (826) | 212 | (695) | 4.3 | (14) | 1.2 | (4) | C | Small bottom drain with valve and spillway. |
| W 3 | Bullocks Pond | 951249 | 1.8 | (6) | 2.8 | (7) | 5.2 | (42) | T,W | 123 | (403) | 98 | (322) | 5.8 | (19) | 1.8 | (6) | A | Bottom drain with valve and overflow standpipe. |
| W 4 | Buzzard Roost Pond | 949187 | 0.6 | (2) | 4.0 | (10) | 2.5 | (20) | W | 59 | (194) | 40 | (130) | 1.8 | (6) | 1.5 | (5) | B | Road is dam. Culvert pipe through road. |
| W 5 | Delos Lake ² | 020182 | 1.2 | (4) | 8.9 | (22) | 10.9 | (88) | W | 113 | (370) | 107 | (350) | 4.3 | (14) | 1.2 | (4) | B | Concrete structure spillway with stop logs. |
| W 6 | Engineer's Pond | 957256 | 1.2 | (4) | 1.6 | (4) | 2.0 | (16) | W | 86 | (282) | 76 | (249) | 2.7 | (9) | 0.9 | (3) | B | Road is dam. Culvert pipe through road. |
| W 7 | Fish Hook Lake | 940230 | 0.6 | (2) | 1.6 | (4) | 1.0 | (8) | W | 18 | (60) | 12 | (40) | 0.9 | (3) | 0.6 | (2) | B | Road is dam. Culvert pipe through road. |
| W 8 | Hamilton Pond | 998146 | 0.6 | (2) | 1.2 | (3) | 0.7 | (6) | W | 61 | (200) | 61 | (200) | 1.8 | (6) | 0.0 | (0) | B | Beaver dam. |
| W 9 | Herns Pond | 036235 | 2.4 | (8) | 2.4 | (6) | 5.9 | (48) | W | 149 | (490) | 37 | (122) | 5.8 | (19) | 1.8 | (6) | A | Bottom drain with valve, earth spillway and overflow standpipe. |
| W 10 | Holmes Pond | 049165 | 0.6 | (2) | 1.6 | (4) | 1.0 | (8) | W | 61 | (200) | 61 | (200) | 1.8 | (6) | 0.0 | (0) | B | Beaver dam. |
| W 11 | Lonesome Gulch Pond | 941194 | 1.5 | (5) | 2.8 | (7) | 4.3 | (35) | T,W | 157 | (516) | 122 | (400) | 4.3 | (14) | 0.9 | (3) | B | Bottom drain with valve and two overflow standpipes. |
| W 12 | Smoots Pond ² | 997100 | 1.2 | (4) | 19.0 | (47) | 23.2 | (188) | W | 122 | (400) | 91 | (300) | 4.3 | (14) | 1.8 | (6) | C | Concrete spillway structure with wooden gates. |
| W 13 | Lower Travis Lake ² | 962251 | 0.9 | (3) | 9.3 | (23) | 8.5 | (69) | W | 91 | (299) | 71 | (233) | 2.7 | (9) | 0.9 | (3) | B | Bottom drain with valve and concrete spillway. |
| W 14 | Upper Travis Lake | 960246 | 1.8 | (6) | 6.5 | (16) | 11.8 | (96) | W | 106 | (348) | 86 | (282) | 5.8 | (19) | 2.4 | (8) | A | Bottom drain with sliding steel gate and concrete spillway. |
| W 15 | White Lake ² | 084123 | 1.2 | (4) | 19.4 | (48) | 23.7 | (192) | T,W | 152 | (500) | 91 | (300) | 4.9 | (16) | 2.7 | (9) | A | Bottom drain with valve and concrete spillway. |

1 Most dams are earth dams with control structures as noted in Remarks; two are beaver dams.
2 Dams on inventory of National Dam Safety Program.
3 T - Training.
W - Wildlife.
4 A- Constructed to full Soil Conservation Service safety standards and would withstand 100 year storm.
B- Would have difficulty withstanding 100 year storm.
C- Inadequate to withstand 100 year storm and could cause minor downstream damage if failed.

ESTIMATED FLOOD DISCHARGES

| MAP NUMBER | STREAM NAME | DRAINAGE AREA km ² (mi ²) | | DISCHARGE AT 10 YEAR FLOOD m ³ /sec (ft ³ /sec) | | DISCHARGE AT 100 YEAR FLOOD m ³ /sec (ft ³ /sec) | |
|------------|------------------|---|--------|--|--------|---|--------|
| 1 | Beverly Run | 22 | (8.5) | 16.4 | (580) | 44.6 | (1575) |
| 2 | Cattlet Creek | 12 | (4.6) | 10.3 | (365) | 28.9 | (1020) |
| 3 | Goldenvale Creek | 37 | (14.3) | 24.9 | (880) | 65.8 | (2325) |
| 4 | Peumansend Creek | 28 | (10.8) | 19.8 | (700) | 53.1 | (1875) |
| 5 | Portabago Creek | 28 | (10.8) | 19.8 | (700) | 53.1 | (1875) |
| 6 | Smoots Run | 22 | (8.5) | 16.4 | (580) | 44.6 | (1575) |
| 7 | Tobacco Creek | 28 | (10.8) | 19.8 | (700) | 53.1 | (1875) |
| 8 | Turkey Creek | 18 | (6.9) | 14.2 | (500) | 38.8 | (1370) |
| 9 | Maracossia Creek | 13 | (5.0) | 11.8 | (415) | 32.6 | (1150) |
| 10 | Meadow Creek | 13 | (5.0) | 11.8 | (415) | 32.6 | (1150) |
| 11 | Mill Creek | 79 | (30.5) | 44.5 | (1570) | 113.3 | (4000) |
| 12 | Mount Creek | 33 | (12.7) | 22.7 | (800) | 60.2 | (2125) |
| 13 | Ware Creek | 13 | (5.0) | 11.8 | (415) | 32.6 | (1150) |



FORT A.P. HILL, VIRGINIA TERRAIN ANALYSIS

SURFACE CONFIGURATION

LOW PLAINS Moderately rolling to nearly level plains; local relief 6 to 46 m (20 to 150 ft); slopes generally between 0 and 30%, some slopes between 30 and 50% in steeper valleys.

SURFACE DRAINAGE

Bank to bank gap width of watercourse:

3-10 m
< 3 m

Estimated flood discharge.

Earth dam.

Reservoir or pond.

Wet area (swamp).

NOTE: Number refers to entry in table.

C. WATER RESOURCES

1. SURFACE WATER

There are adequate supplies of surface water available on Fort A. P. Hill during periods of normal rainfall, but the stream flow becomes unusually low during periods of extreme drought; storage reservoirs would be necessary to provide continuous dependable supplies. All the surface waters on the post are moderately soft, slightly acidic and high in iron content.

The north, central and eastern portions of the post are drained off post by the Rappahannock River and the south and western portions are drained off post by the Mattaponi River. Flooding is a minor problem and of short duration, usually after a short rainfall of high intensity.

Information on surface water resources is summarized below. There are no stream flow gaging or water quality testing stations on the post and adequate data for a full evaluation of the volume of water available from the various streams listed were not available. Some spot checks of water velocity and discharge were taken at various points on the post during limited field investigations and these are depicted on the accompanying map. The data obtained are included in Section B, SURFACE DRAINAGE, where they have been interpreted in the Estimated Flood Discharges table and as the Velocity and Discharge column of the Drainage Characteristics table.

The point at which each category shown on the map starts and ends depends on variations in flow, and moves upstream or downstream reflecting daily, seasonal or annual variations in volume in the source area. In general, the high-flow period extends from November through April. The lowest flows may be expected in August through September.

| MAP UNIT | SOURCES | QUANTITY | QUALITY | DEVELOPMENT OF SOURCES |
|----------|---|--|---|--|
| 1 | The middle reaches of Smoots Run and Beverly Run, which occupy the southern portion of the post, flow southward towards the Mattaponi River through Smoots Pond and White Lake. The middle and lower reaches of Mill Creek, Mount Creek and Portabago Creek, occupy the central and eastern portions of the post and flow east and northeast towards the Rappahannock River. The streams are perennial and their headwaters are all located on the reservation. The entire post area is within 11.3 km (7 mi) of one of these sources. Streams generally flow on fairly narrow floodplains. | <u>Very large</u> * quantities of fresh water are available from these sources. Average yields range from 4000 to 40,000 lpm (1,500,000 to 15,000,000 gpd). During high-water periods or floods, quantities of water would be greater. | There are no data available for individual streams. Based on regional considerations, it is estimated that natural stream waters are moderately soft, and are fairly high in total dissolved solids; they are slightly acidic and high in iron content. Sources of industrial and municipal pollution are absent, but some organic and bacterial contamination are present, particularly in temporary ponds behind beaver dams. Suspended sediment loads may be undesirably high during high water periods. | Access to streams is limited by trees, undergrowth and, in many places, wet areas. Banks are clay or sandy clay, steep with 50% to 70% slope, and generally 1.5 to 2 m (5 to 7 ft) high. Average velocity is estimated at 0.3 m/sec (1 ft/sec) but may be greater during high-water periods. |
| 2 | The upper reaches of Smoots Run and Beverly Run, in the southern portion of the post and the upper reaches of Mill Creek, Mount Creek and Portabago Creek in the central and eastern portions of the reservation; the lower and middle reaches of Catlett Creek, Maracossia Creek, Meadow Creek and Turkey Creek which flow generally southward through several ponds and reservoirs on the west and southwest portion of the post; and the lower and middle reaches of Goldenvale Creek, Peumansend Creek, Tobacco Creek and Ware Creek which flow east and northeast through several ponds and reservoirs on the central, north and east portions of the reservation. These streams are perennial and most areas on the post are within 4 km (2.5 mi) of one of them. | <u>Large</u> quantities of fresh water are available from these sources. Average yields range from 400 to 4000 lpm (150,000 to 1,500,000 gpd). During high-water or floods, quantities of water would be greater. | There are no data available for individual streams. It is estimated that natural stream waters are moderately soft, high in iron content and slightly acidic. Suspended sediment load will increase during high-water or flood periods. | Access to streams is limited by trees, undergrowth and, in many places, wet areas. Banks are clay or sandy clay, steep with 50% to 70% slope, and generally 1.5 to 2 m (5 to 7 ft) high. Average velocity is estimated at 0.3 m/sec (1 ft/sec) but may be greater during high-water periods. |
| 3 | The upper reaches of all perennial streams and most areas on the post lie within 2.4 km (1.5 mi) of one of them. Streams have moderate to narrow floodplains, and occasionally narrow valleys, particularly in the northeast portion of the post. | <u>Moderate</u> quantities of fresh water are available from these sources. Average yields range from 40 to 400 lpm (15,000 to 150,000 gpd) throughout the year. Quantities will increase during high water periods. | There are no data available for individual streams. It is estimated that natural stream waters are moderately soft, high in iron content and slightly acidic. Suspended sediment load will increase during high-water or flood periods. | Access to streams is restricted by trees and undergrowth and also by wet areas in many places. Banks are lower, 0.9 to 1.5 m (3 to 5 ft), but generally retain 50% to 70% slope. Longitudinal slopes are gentle. |
| 4 | The extreme upper reaches of all perennial streams, the portion that has minimal flow during the dryer months of the year. Most areas on the post are within 1.6 km (1 mi) of one of these sources. | <u>Small</u> quantities of fresh water are available from these sources. The yield ranges from 4 to 40 lpm (1500 to 15,000 gpd) but will increase somewhat during wet months. | There are no data available for individual streams. It is estimated that natural stream waters are moderately soft, high in iron content and slightly acidic. Suspended sediment load will increase during high-water or flood periods. | Access to streams is restricted by trees and undergrowth. Banks are lower, 0.9 to 1.5 m (3 to 5 ft), but generally retain 50% to 70% slope. Longitudinal slopes are gentle. |

*NOTE: Definitions of underlined terms are as follows:

| Quantity | Liter per minute (lpm) | Gallons per day (gpd) |
|------------|------------------------|------------------------|
| Very large | 4000 - 40,000 | 1,500,000 - 15,000,000 |
| Large | 400 - 4000 | 150,000 - 1,500,000 |
| Moderate | 40 - 400 | 15,000 - 150,000 |
| Small | 4 - 40 | 1500 - 15,000 |

USER NOTE: For permissible concentrations of impurities in military water supplies, see Department of the Army Technical Manual TM 5-700, Field Water Supply, July 1967, paragraph 19, or other applicable manuals or regulations.

RESERVOIRS AND PONDS

| MAP NUMBER | NAME | GRID REFERENCE | APPROXIMATE HECTARES (ACRES) | QUALITY |
|------------|---------------------|----------------|------------------------------|--|
| W1 | Beaver Dam Pond | 955176 | 3.6 (9) | Poor, some bacterial contamination. High sediment level after heavy rainfall or during high water periods. |
| W2 | Bowies Pond | 913189 | 8.5 (21) | |
| W3 | Bullocks Pond | 951249 | 2.8 (7) | |
| W4 | Buzzard Roost Pond | 949187 | 4.0 (10) | |
| W5 | Delos Lake | 020182 | 8.9 (22) | |
| W6 | Engineers Pond | 957256 | 1.6 (4) | |
| W7 | Fish Hook Lake | 940230 | 1.6 (4) | |
| W8 | Hamilton Pond | 998146 | 1.2 (3) | |
| W9 | Herns Pond | 036235 | 2.4 (6) | |
| W10 | Holmes Pond | 049165 | 1.6 (4) | |
| W11 | Lonesome Gulch Pond | 941194 | 2.8 (7) | Good, moderately soft. Good, moderately soft. Poor. High sediment level after rainfall. |
| W12 | Smoots Pond | 997100 | 19.0 (47) | |
| W13 | Lower Travis Lake | 962251 | 9.3 (23) | |
| W14 | Upper Travis Lake | 960246 | 6.5 (16) | |
| W15 | White Lake | 084123 | 19.4 (48) | |

2. GROUND WATER

Fort A. P. Hill relies on ground water from over twenty wells as the source of potable water supply. This water is drawn from the unconsolidated sands, gravels and clays of the Coastal Plain aquifers. The major aquifer is the Patuxent Formation of Lower Cretaceous age which supplies moderate to large quantities of fresh ground water from deep wells. Small quantities of fresh ground water are available at shallow depths from the Pleistocene terrace deposits which veneer the upland plains and from Recent alluvium in the low-lying stream valleys.

The Patuxent Formation dips gently to the southeast, increasing gradually in thickness and depth from the recharge area along the Fall Line to the Atlantic coast. Ground water occurs in lenticular sand and gravel zones, commonly overlain by relatively impermeable clay beds which act as aquicludes to produce locally variable artesian conditions.

The local water table aquifer in Recent alluvium and Pleistocene terrace deposits tends to follow the topography, occurring at slightly greater depths under the upland plains than in low-lying areas and stream valleys.

Ground water yields in the Coastal Plain can be unpredictable due to local variation of the water-bearing zones and confining clay lenses. Maximum yields are obtained by penetrating the saturated zones of the Patuxent Formation; actual yield cannot be determined until well stimulation and development are complete. Proper well construction is critical to obtain maximum yields and prevent sand infiltration. Generally speaking, a deep well is less subject to seasonal variation and contamination than a shallow well at the same locale.

Deep wells yield a very soft sodium bicarbonate water. Hardness decreases in the southeast and with depth, as calcium is replaced by sodium in the Coastal Plain waters. By contrast, total mineral constituents increase in the southeast and with depth. Locally, deep ground water may contain objectionable amounts of iron, sulfides, silicates and fluorides. Shallow wells generally produce a hard, acidic water which may contain excessive amounts of iron.

Chemical, physical and radiological analyses indicate that both deep and shallow sources are satisfactory for use in potable water systems; however, because no microbiological testing was done, pretreatment and monitoring of ground water supplies is recommended.

C. WATER RESOURCES (Continued)

2. GROUND WATER (Continued)

| MAP UNIT | QUANTITY AND SOURCE | DEPTH | QUALITY | DEVELOPMENT OF SOURCES |
|----------|--|---|--|--|
| 1 | <p>Moderate* to large quantities of fresh ground water are generally available from the unconsolidated sand and gravel Coastal Plain aquifers of Cretaceous Age (Patuxent Formation). The aquifers exhibit local variable artesian conditions; maximum thickness is approximately 91 m (300 ft). Well cuttings indicate principal composition to be gray arkosic sand with lesser amounts of sand and gravel; thick beds of quartz sand occur locally at the top of the formation. Recharge is primarily from precipitation along the outcrop area immediately east of the Fall Line; some recharge is by slow vertical infiltration through overlying aquicludes. Seasonal variation in static water levels has been monitored at less than 0.5 m (1.5 ft). Storage coefficients and transmissivities are generally low; due to the variable depths and wide spacing, of wells, interference is not a problem. Wells penetrating the aquifers at Fort A. P. Hill have recorded sustained yields from 61 to 454 lpm (23,040 to 172,800 gpd); specific capacities ranged from 2.4 to 18.3 l/m (0.2 to 1.5 g/ft).</p> | <p>For maximum yields, deep wells can range in depth from 107 m to 171 m (350 to 560 ft). Several water bearing zones 3 to 4.6 m (10 to 15 ft) thick have been logged at depths from 103 to 167 m (338 to 547 ft); these zones exhibit local artesian conditions. Relation of yield to depth is controlled by the number of localized water-bearing zones encountered; these zones are lenticular in shape and variable in extent. Two recent wells at Wilcox Camp (grid coordinates 989197 and 991194), less than 361 m (1184 ft) apart, were drilled to total depths of 155 m (510 ft) and 110 m (360 ft), while tested yields were 95 lpm (36,000 gpd) and 379 lpm (144,000 gpd), respectively. Hydrostatic levels averaging 38 to 57 m (124 to 187 ft) in depth could indicate artesian head up to approximately 61 m (200 ft); however, no flowing wells have been reported. Variation with season is minimal (< 0.5 m [1.5 ft]); drawdowns measured during 48 hour pump tests ranged from 21 to 46 m (68 to 150 ft) and averaged 32 m (106 ft). Rebound rates after pump tests at two recent wells at Wilcox Camp (grid coordinates 989197 and 991194) were 5.0 m/hr (16.4 ft/hr) and 3.1 m/hr (10.3 ft/hr), respectively.</p> | <p>Ground water in the Patuxent Formation is generally suitable for all uses including human consumption. Deep wells yield a very soft to moderately soft sodium bicarbonate water with hardness tending to decrease southeastward and with depth, as calcium is replaced by sodium. Total dissolved solids range from 116.0 mg/l to 470.0 mg/l[†] and average 253.7 mg/l; one abandoned deep well at Heth HQ (grid coordinates 939241) had 760 mg/l total dissolved solids. Fluoride concentrations are 0.1 mg/l to 1.4 mg/l; pH values range from 7.6 to 8.4. Many wells yield water with high concentrations of iron (> 0.3 mg/l) and sulfides; some deep ground water contains objectionable amounts of dissolved hydrogen sulfide. The results of periodic chemical analyses of fourteen deep wells at Fort A. P. Hill are presented in a subsequent table. Water treatment currently consists of the addition of sodium hexametaphosphate to reduce corrosion and chlorine for disinfection of possible biological contaminants.</p> | <p>All locations within this map unit are potentially favorable well sites except for narrow catchments and drainageways. Access to sites is often limited by thick vegetation. Fairly stable level ground in close proximity to water use areas is easily located. All wells should penetrate the maximum thickness of aquifer or until well logging indicates water zones of sufficient quantity at shallower depths. Well construction is most often by rotary drilling methods; hole diameters range from 56 cm (22 in) at the surface to 15 cm (6 in) or 20 cm (8 in) in producing zones. Steel well casings 15 to 46 cm (6 to 18 in) in diameter are installed full depth to producing zones; graded gravel wall packing is necessary to guarantee a sand-free well. Slotted stainless steel well screens are used within the producing zone(s) with gravel stabilizers around the screen assembly. Surface grouting is required for sanitary sealing. Grouting should extend to the depth necessary to preclude infiltration of poorer quality shallow ground water. Well development techniques used are high pressure fluid or air injection followed by surging (back-washing) to eliminate fine particulate matter. Actual sustained yields have been determined by 48 hour pump tests after well development is complete; results of pump tests for eight deep wells in this map unit are tabulated below.</p> |
| | <p>Small quantities of fresh ground water are generally available from shallow wells in upland Pleistocene terrace deposits which consist of up to 30 m (100 ft) of cross-bedded sand and gravel underlain with varying amounts of clay. Seasonal variation of this water table aquifer can be considerable; the water table generally conforms with surface topography, although it is somewhat flatter. Recharge is local from rain-fall infiltrating the permeable soil and from influent seepage of nearby streams. Estimated storage coefficients range from .01 to .20 and transmissivities range from 43 to 173 lpm/m (5000 to 20,000 gpd/ft). Shallow wells yield 6 to 38 lpm (2160 to 14,400 gpd); specific capacity is near 1.6 l/m (0.13 g/ft).</p> | <p>Shallow wells in the unconfined Pleistocene terrace deposits encounter the local water table at depths of 9 to 30 m (30 to 100 ft); these depths are subject to large seasonal variations. The only shallow wells tapping this local water table are at the Facilities Engineer Warehouse (grid coordinates 004186) and Dirt Bridge Warehouse (grid coordinates 956221). The well at Facilities Engineer Warehouse was tested at a capacity of 6 lpm (2160 gpd) with resulting drawdown of 3.7 m (12 ft). Total well depth is 11 m (36 ft) with a static water level of 7 m (22 ft) below ground surface. No data are available for the well at Dirt Bridge Warehouse. Maximum yields are generally available at depths of 15 to 18 m (50 to 60 ft).</p> | <p>The local water table aquifer generally yields a hard, acidic water which often contains excessive amounts of iron derived from the rusty red and orange Pleistocene deposits. The waters are often low in total dissolved solids and mineral constituents and relatively high in nitrates from surface wash of nitrogenous organic materials. Ground water is generally fresh and potable; minor pretreatment is required. Chemical analysis of shallow well Number 4 (Facilities Engineer Warehouse - grid coordinates 004186) in the accompanying table is fairly representative of water derived from shallow wells in the Coastal Plain.</p> | <p>Shallow water table wells should be drilled on concave slopes; broad but slight concave slopes near saddles in gently rolling upland areas are especially good sites for potentially high-yielding wells. Steep sided depressions, such as gullies and ravines, are not considered acceptable sites for wells. Shallow dug or bored wells, if poorly located, can be unreliable. Special consideration must be given to the possibility of surface contamination, even though surface sanitary sealing is used, due to the highly permeable nature of the terrace deposits. Wells should be cased and bottoms screened; pump size and intake depth must be chosen carefully to prevent sand contamination and pump locking.</p> |
| 2 | <p>Moderate to large quantities of fresh ground water are generally available at moderate depths from the unconsolidated sand and gravel aquifers of the Patuxent Formation along the Rappahannock River terraces and along stream valleys above watercourses. The major distinction between deep wells in this map unit and wells in map unit one is that shallower depths are required to obtain maximum yield. Wells are located at Pender Campsite (grid coordinates 984318) yielding 344 lpm (131,040 gpd) and Cooke Camp (grid coordinates 085245) yielding 454 lpm (172,800 gpd); specific capacities are 8.8 l/m (0.7 g/ft) and 8.3 l/m (0.7 g/ft), respectively. Local lateral and vertical recharge is from influent of Rappahannock River water and from local high water tables.</p> | <p>Moderately deep wells will encounter maximum water producing zones at depths of 55 to 91 m (180 to 300 ft); depths will be slightly greater along interior stream valleys than along Rappahannock River terraces, due to topography. Relation of yield to depth is controlled by the number of localized water bearing zones encountered. An abandoned well at Cooke Camp (grid coordinates 085245) 70 m (230 ft) deep had a static water level of 3 m (10 ft) below ground while a producing well at Pender Campsite (grid coordinates 984318) 55 m (182 ft) deep had a static water level of 7 m (22 ft) below the surface; drawdowns measured 55 m (179 ft) and 39 m (129 ft), respectively. Elevation of the piezometric water surface is near 12 m (40 ft) above sea level at both sites. Seasonal variation of yield from this aquifer is insignificant.</p> | <p>Ground water from moderately deep wells is a fresh moderately soft sodium bicarbonate water with hardness tending to decrease southeastward and with depth, as calcium is replaced by sodium. It is generally suitable for all uses, including human consumption. Total dissolved solids concentrations may be somewhat higher along Rappahannock River terraces; these are expected to range from 300 mg/l to 500 mg/l with high concentrations of iron and sulfides throughout the map unit. Contamination from surface runoff and periodic flooding may be a problem in the narrow stream valleys.</p> | <p>Access to drilling sites is provided by a fairly good secondary and unimproved road network; however, steep unstable slopes and widespread marshes hamper drilling efforts along the narrow stream valleys. All locations on the gradually sloping Rappahannock River terraces are potentially favorable well sites. Well construction is most often by rotary drilling methods and steel well casings are installed full depth to producing zones. Graded gravel wall packing is necessary to guarantee a sand-free well. Slotted stainless steel well screens are used within the producing zone(s) with gravel stabilizers around the screen assembly. Surface grouting is required for sanitary sealing. Grouting should extend to the depth necessary to preclude infiltration of poorer quality shallow ground water. Well development techniques used are high pressure, fluid or air injection followed by surging (back-washing) to eliminate fine particulate matter. Pumps should be sized to provide operational yield of no more than 60-75 percent of the tested sustained yield to prevent pumping of fine sand and particulate matter. Two moderately deep wells located several hundred meters apart would provide a higher total pumping capacity with less drawdown than one deep well.</p> |
| | <p>Small quantities of fresh ground water are generally available at shallow depths from Recent alluvium along major drainageways and Rappahannock River terraces. These Recent deposits do not contain appreciable amounts of water; small yields are available at depths of 1.5 m (5 ft) to 4.6 m (15 ft). Recharge is from local precipitation and stream infiltration; for these reasons the aquifer has an un dependable, fluctuating water supply. No known wells tap the alluvial deposits in this area.</p> | <p>Wells in Recent alluvium could reach depths of 4.6 m (15 ft) to obtain yields of 11.4 lpm (4320 gpd); yields of 6 lpm (2160 gpd) may be obtained within 1.5 m (5 ft) of the surface in some areas. Seasonal water levels fluctuate greatly; highest water tables occur from November through April; lowest water tables occur from August through September.</p> | <p>Ground water from the alluvial deposits is generally fresh and potable; the hard acidic waters are often low in total dissolved solids and mineral constituents and high in suspended solids and nitrates from surface wash of nitrogenous organic materials. During periods of high surface runoff and flooding, the water in alluvial deposits may be unfit for human consumption.</p> | <p>Shallow dug or bored wells in alluvial deposits should be located along the edge of floodplains, though such sources are seasonally unreliable. Access to these sites is hampered by thick vegetation, steep slopes, and widespread marshes. Emergency field supplies of potable water may be obtained at shallow depths during most of the year. The Rappahannock River terraces have good access and flat to gently sloping surfaces. Wells should be cased, gravel packed, and production zones screened and sealed to prevent surface water from entering the casing. Special consideration of the highly permeable nature of the alluvial deposits will reduce the possibility of contamination.</p> |

*NOTE: Definitions of underlined terms are as follows:

| Quantity | Liters Per Minute (lpm) | Gallons Per Day (gpd) |
|----------|-------------------------|-----------------------|
| Large | 400 - 4000 | 150,000 - 1,500,000 |
| Moderate | 40 - 400 | 15,000 - 150,000 |
| Small | 4 - 40 | 1500 - 15,000 |

| Quality | |
|-------------|--|
| Fresh water | (1) Maximum chlorides: 600 mg/l (2) Maximum sulfates : 400 mg/l (3) Maximum total dissolved solids : 1500 mg/l |

† For purposes of this study, milligrams per liter (mg/l) may be taken to be roughly equivalent to parts per million (ppm).

USER NOTE: For permissible concentrations of impurities in military water supplies, see Department of the Army Technical Manual TM 5-700, Field Water Supply, July 1967, paragraph 19, or other applicable manuals or regulations.

SUMMARY OF DATA FROM SELECTED WELLS

| WELL NUMBER | GRID REFERENCE | LOCATION | DEPTH m (ft) | STATIC WATER LEVEL (Below ground surface) m (ft) | TESTED SUSTAINED YIELD lpm (gpd) | DRAWDOWN m (ft) | SPECIFIC CAPACITY ¹ l/m (g/ft) |
|---|----------------|-------------------------------|--------------|--|----------------------------------|-----------------|---|
| 1 | 956163 | Post HQ | 132 (433) | 52 (170) | 329 (125,280) | 23 (75) | 14.4 (1.2) |
| 2 | 957160 | Post HQ | 98 (322) | 65 (214) | 61 (23,040) | 26 (84) | 2.4 (0.2) |
| 3 | 954160 | Post Trailer Park | 125 (410) | 52 (170) | 125 (47,520) | 39 (128) | 3.2 (0.3) |
| 4 | 004186 | Facilities Engineer Warehouse | 11 (36) | 7 (22) | 6 (2,160) | 4 (12) | 1.6 (0.1) |
| 5 | 991196 | Wilcox Camp | 127 (417) | 57 (187) | 329 (125,280) | 32 (105) | 10.3 (0.8) |
| 6 | 989197 | Wilcox Camp | 155 (510) | 56 (183) | 95 (36,000) | 38 (126) | 2.5 (0.2) |
| 7 | 991194 | Wilcox Camp | 110 (360) | 40 (131) | 379 (144,000) | 21 (68) | 18.3 (1.5) |
| 8 | 940241 | Heth HQ | 159 (521) | 38 (124) | 329 (125,280) | 33 (109) | 9.9 (0.8) |
| 9 | 938233 | Davis Campsite | 170 (558) | 40 (131) | 242 (92,160) | 46 (150) | 5.3 (0.4) |
| 10 | 984318 | Pender Campsite | 55 (182) | 7 (22) | 344 (131,040) | 39 (129) | 8.8 (0.7) |
| 11 * | 085245 | Cooke Camp | 70 (230) | 3 (10) | 454 (172,800) | 55 (179) | 8.8 (0.7) |
| * Well abandoned. | | | | | | | |
| 1 l/m : liters per meter g/ft : gallons per foot | | | | | | | |

C. WATER RESOURCES (Continued)

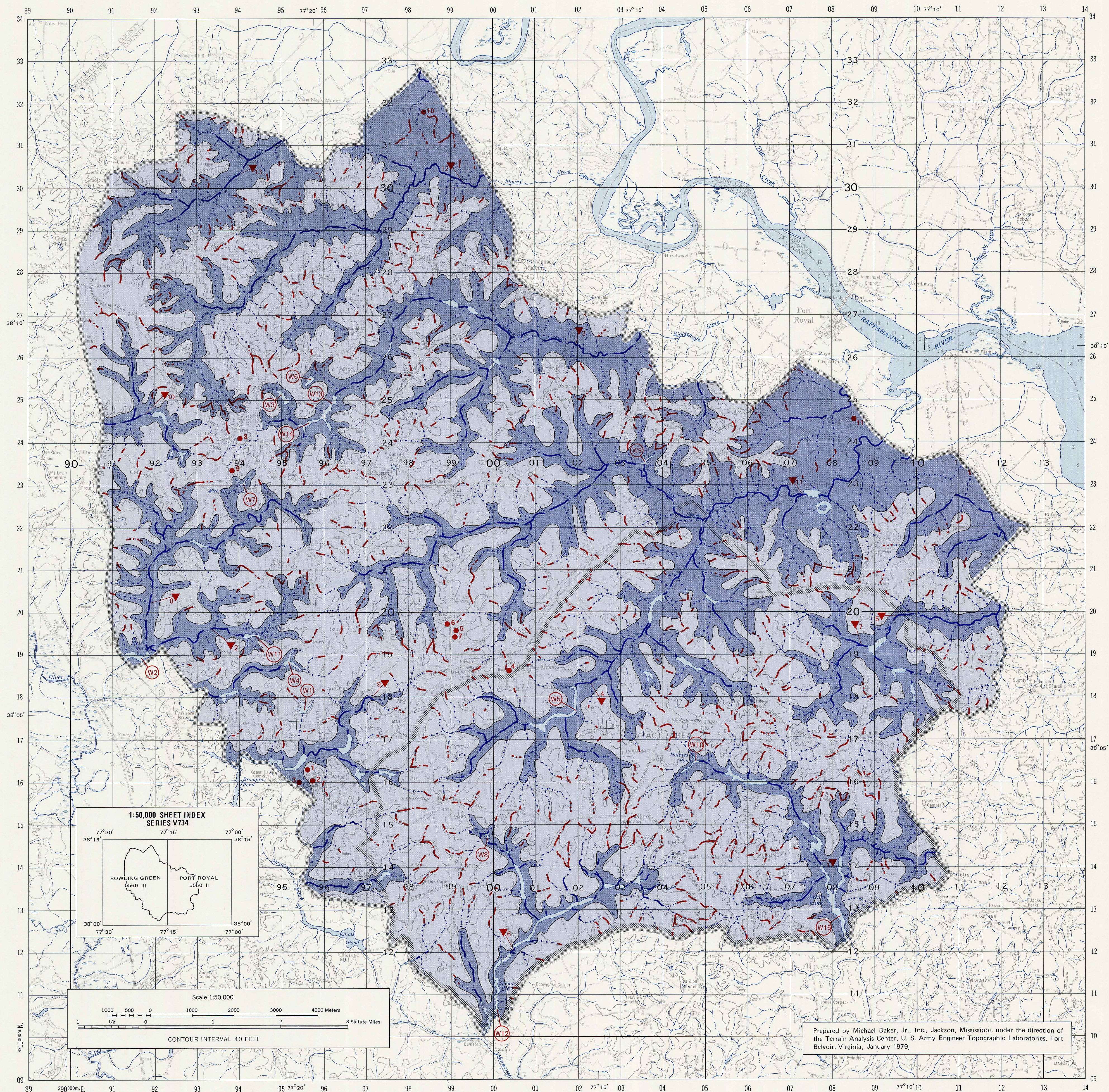
2. GROUND WATER (Continued)

GROUND WATER QUALITY ANALYSIS OF FORT A. P. HILL WELLS
[In milligrams per liter (mg/l) except for pH]

| WATER QUALITY PARAMETER | DEEP WELLS * | | | SHALLOW WELL NUMBER 4 ACTUAL |
|--|--------------|---------|---------|---------------------------------|
| | MINIMUM | MAXIMUM | AVERAGE | |
| Alkalinity (as CaCo ₃) | 100.0 | 184.0 | 126.9 | 28.0 |
| pH (pH units) | 7.6 | 8.4 | 7.9 | 6.9 |
| Total Hardness (as CaCo ₃) | 3.8 | 374.0 | 64.7 | 13.0 |
| Total Dissolved Solids | 116.0 | 470.0 | 253.7 | 104.0 |
| Silica | 10.8 | 32.6 | 21.1 | 15.0 |
| Iron | 0.03 | 4.08 | 0.89 | 2.06 |
| Manganese | NIL | 0.2 | 0.04 | 0.02 |
| Calcium | 0.7 | 82.9 | 15.1 | 4.2 |
| Magnesium | 0.2 | 40.6 | 6.5 | 0.6 |
| Sodium | 5.8 | 145.4 | 51.7 | 13.6 |
| Bicarbonate | 122.0 | 224.5 | 153.7 | 34.2 |
| Chloride | 4.0 | 106.0 | 13.4 | 5.0 |
| Sulfate | 4.5 | 193.0 | 31.7 | 10.7 |
| Nitrate | NIL | 0.7 | 0.2 | 6.7 |
| Fluoride | NIL | 1.34 | 0.39 | 0.1 |
| Arsenic | 0.01 | 0.01 | 0.01 | N/A |
| Barium | 0.3 | 0.3 | 0.3 | N/A |
| Cadmium | 0.005 | 0.005 | 0.005 | N/A |
| Chromium | 0.025 | 0.025 | 0.025 | N/A |
| Lead | 0.005 | 0.007 | 0.005 | N/A |
| Mercury | 0.0002 | 0.0002 | 0.0002 | N/A |
| Selenium | 0.005 | 0.005 | 0.005 | N/A |
| Silver | 0.025 | 0.025 | 0.025 | N/A |

All analyses provided by Facilities Engineer, Fort A. P. Hill.

*Based on fourteen (14) deep well analyses at Fort A. P. Hill.



FORT A.P. HILL, VIRGINIA **TERRAIN ANALYSIS** **WATER RESOURCES**

SURFACE WATER

FRESH WATER PERENNIALY PLENTIFUL

1. Very Large* quantities available from stream stretches within 11.3 kilometers (7 miles) of any point on the post.
2. Large quantities available from stream stretches within 4 kilometers (2.5 miles) of any point on the post.
3. Moderate quantities available from upper reaches of streams within 2.4 kilometers (1.5 miles) of any point on the post.

FRESH WATER SCARCE

4. Small quantities available from extreme upper reaches of perennial streams, within 1.6 kilometers (1 mile) of any point on the post.

(W15)

Standing water body.

▼13

Estimated flood discharges. See Section B, SURFACE DRAINAGE for data.

NOTE: Number refers to entry in table.

*NOTE: Definitions of underlined terms are as follows:

| Quantity | Liters Per Minute (lpm) | Gallons Per Day (gpd) |
|------------|-------------------------|------------------------|
| Very large | 4000 - 40,000 | 1,500,000 - 15,000,000 |
| Large | 400 - 4000 | 150,000 - 1,500,000 |
| Moderate | 40 - 400 | 15,000 - 150,000 |
| Small | 4 - 40 | 1500 - 15,000 |

| Quality | |
|-------------|--|
| Fresh water | (1) Maximum chlorides: 600 mg/l (2) Maximum sulfates : 400 mg/l (3) Maximum total dissolved solids : 1500 mg/l |

For purposes of this study, milligrams per liter (mg/l) may be taken to be roughly equivalent to parts per million (ppm).

USER NOTE: For permissible concentrations of impurities in military water supplies, see Department of the Army Technical Manual TM 5-700, Field Water Supply, July 1967, Paragraph 19, or other applicable manuals or regulations.

GROUND WATER

FRESH WATER GENERALLY PLENTIFUL

1. Moderate* to large quantities of fresh ground water available from deep wells in unconsolidated sand and gravel aquifers; small quantities of fresh ground water available from moderately shallow wells in upland terrace deposits.
2. Moderate to large quantities of fresh ground water available from moderately deep wells in unconsolidated sand and gravel aquifers; small quantities of fresh ground water available from shallow wells in alluvial deposits.

Well

NOTE: Number refers to entry in table.

D. ENGINEERING SOILS

The table below and the accompanying engineering soils map were prepared to give an indication of the engineering properties and distribution of the major soils groups. The accuracy of the information provided is considered to be reliable and adequate for general planning. It is presented for use as a guide and is not intended to supplant detailed on-site investigations for specific uses.

The map is based on information obtained from publications prepared by the U.S. Soil Conservation Service, from U.S. Army Corps of Engineers foundation analyses and from publications prepared by the Virginia Division of Mineral Resources, supplemented by aerial photograph interpretation and limited field examinations. The soils are grouped into four map units, each containing soils having generally similar characteristics and engineering properties as well as key landform associations (upland, floodplain, slopes). The soil profiles summarized in the table are highly generalized and represent “average” typical profiles that can be expected for each map unit; actual conditions may vary to some extent, especially the sand, silt and clay content of the individual layers. Each of the four soil units is evaluated in terms of its limitations (slight, moderate, severe) for six engineering applications, along with the identification of major constraints such as flooding, steep slopes, etc., which would limit its use.

Fort A. P. Hill lies within the Coastal Plain physiographic province. Elevations range from about 3 to 78 meters (10 to 255 feet) above mean sea level. All of the area is underlain by unconsolidated sediments of the Coastal Plain which dip gently seaward at the rate of about 3 meters (10 feet) per mile. These sediments have been severely dissected by a dendritic network of small streams with steep side slopes (8 to 30 percent). The streams have eroded narrow valleys 18 to 24 meters (60 to 80 feet) deep throughout all but the northern part of the post where the relief increases to almost 61 meters (200 feet) along the terraces bordering the Rappahannock River Valley.

The sediments have a 12 to 24 meter (40 to 80 feet) thick veneer of mixed and layered terrace sands with some clay from which most of the present soils have been developed. The gently sloping upland soils are well-drained, deep, fine sand and sandy loam. They are extensive and occupy a large area of Fort A. P. Hill. They have few limitations for most uses.

Valleys eroded deeply enough to cut through the sandy veneer expose the underlying clays, sands, and marls. The soils of the valley slopes vary considerably in their sand, clay and silt content. Erosion has locally concentrated gravel in the upper 30 centimeters (1 foot) of soil on some of the side slopes and streams in the northwestern part of the post. The clays have low permeability, moderate to high shrink and swell, and are usually unsuitable for building foundations. Because of the slope and variation in materials, this soil is limited in use.

The valley floors have nearly level floodplains with poorly drained soils and meandering streams containing numerous beaver dams. Most crossings require culverts or bridges.

The northeastern edge of the reservation has a small area of nearly level river valley floodplain and river terraces. The sandy clay loam soils are well to poorly drained with local variation in the water table. Some of the large flat areas are good building sites.

The depth to bedrock ranges from 122 to 183 meters (400 to 600 feet). There are no bedrock outcrops or rock quarries on the reservation.

SOIL CHARACTERISTICS AND SELECTED EVALUATIONS

| MAP UNIT | LANDFORM AND SLOPE | TYPICAL SOIL PROFILE ¹ LAYERS, THICKNESS OF LAYERS, DEPTH TO ROCK AND UNIFIED ENGINEERING CLASSIFICATION (PROFILES NOT TO SCALE) | | HIGH WATER TABLE (DEPTH AND DURATION) | PERME- ABILITY | SHRINK- SWELL POTENTIAL | RATING AND MAJOR LIMITING SOIL CHARACTERISTICS FOR: | | | | | | MAJOR SOIL SERIES ² AND REMARKS |
|----------|---|--|----------------|--|---|-------------------------|---|-------------------|---------------------------------|----------------|---------------------|------------------|--|
| | | | | | | | SEWAGE LAGOONS | SANITARY LANDFILL | FOUNDATIONS FOR SMALL BUILDINGS | ROAD LOCATION | SHALLOW EXCAVATIONS | TRAFFIC- ABILITY | |
| 1 | Well-drained sandy soils on gently rolling uplands. Slope generally 1 to 4% with 0 to 8% range. | cm | SM | Brown loose loamy fine sand. | Greater than 2 m (6 ft) | High | Low | Severe (e) | Slight | Slight | Slight | Slight | Major soil series: Sassafras, Kempsville, Caroline, and Rumford. Best overall soil for most engineering uses. Subject to rapid erosion when stripped of vegetation unless run-off controlled. |
| | | 30 | SC | Layers of fine sand with varying amounts of silt and clay. | | | | | | | | | |
| | | | SM SP | Depth to clay generally 3 to 20 m (10 to 66 ft). | | | | | | | | | |
| 2 | Loamy, gravelly sand and clay soils on rolling to steep terrain bordering drainageways. Slope generally 8 to 15% with 8 to 40% range. | cm | CL | Brown fine clayey sand and sandy or silty clay loam, locally gravelly. | 2 m (6 ft) to none | Low | Moderate to High | Slight | Severe (r) | Slight (r) | Severe (s,c,w) | Moderate (c) | Major soil series: Caroline and Altavista. Slopes and clay subbase limit engineering uses. Small gravel concentrated locally on upper slopes and in stream beds in northern part of reservation. |
| | | 20 | GC | | | | | | | | | | |
| | | | CH ML OH | Intermingled layers of clay and silt grading to organic silty clay in some places. Depth to bedrock ≥ 120 m (400 ft). | | | | | | | | | |
| 3 | Poorly drained sandy clay and silt in narrow, nearly level areas of swamp, marshland, and floodplain along streams. | cm | OH | Grayish-brown loamy sand and clay with varying amount of organic material. | 0 to 2 m (6 ft) February thru May | Low | Moderate | Severe (f) | Severe (f,r) | Severe (f,l,v) | Severe (f,l,v,w) | Moderate (f,w) | Major soil series: Bibb complex, Ochlockonee, and mixed alluvium. High water table with frequent flooding. Culverts ordinarily required for all road crossings. |
| | | 20 | SM | | | | | | | | | | |
| | | | CH CL ML | Mixed and layered silt, clay and sand. Depth to bedrock ≥ 120 m (400 ft) | | | | | | | | | |
| 4 | Well to poorly drained clay loam on the broad area of nearly level Rappahannock River floodplain and terraces. Slope 0 to 2%. | cm | ML | Brown sandy loam. | 0.3 to 1.6 m (1 to 5 ft) February thru May | High to Low | Moderate | Slight | Severe (f,w) | Severe (f,l,w) | Severe (f,l,w) | Severe (f,c,w) | Major soil series: Wickham, Altavista, Augusta, and Roanoke. River terraces near Cooke Campsite. Low areas have high water table. |
| | | 25 | CL | Yellowish-red clay and sandy clay loam. | | | | | | | | | |
| | | | CH | Depth to bedrock ≥ 120 m (400 ft). | | | | | | | | | |

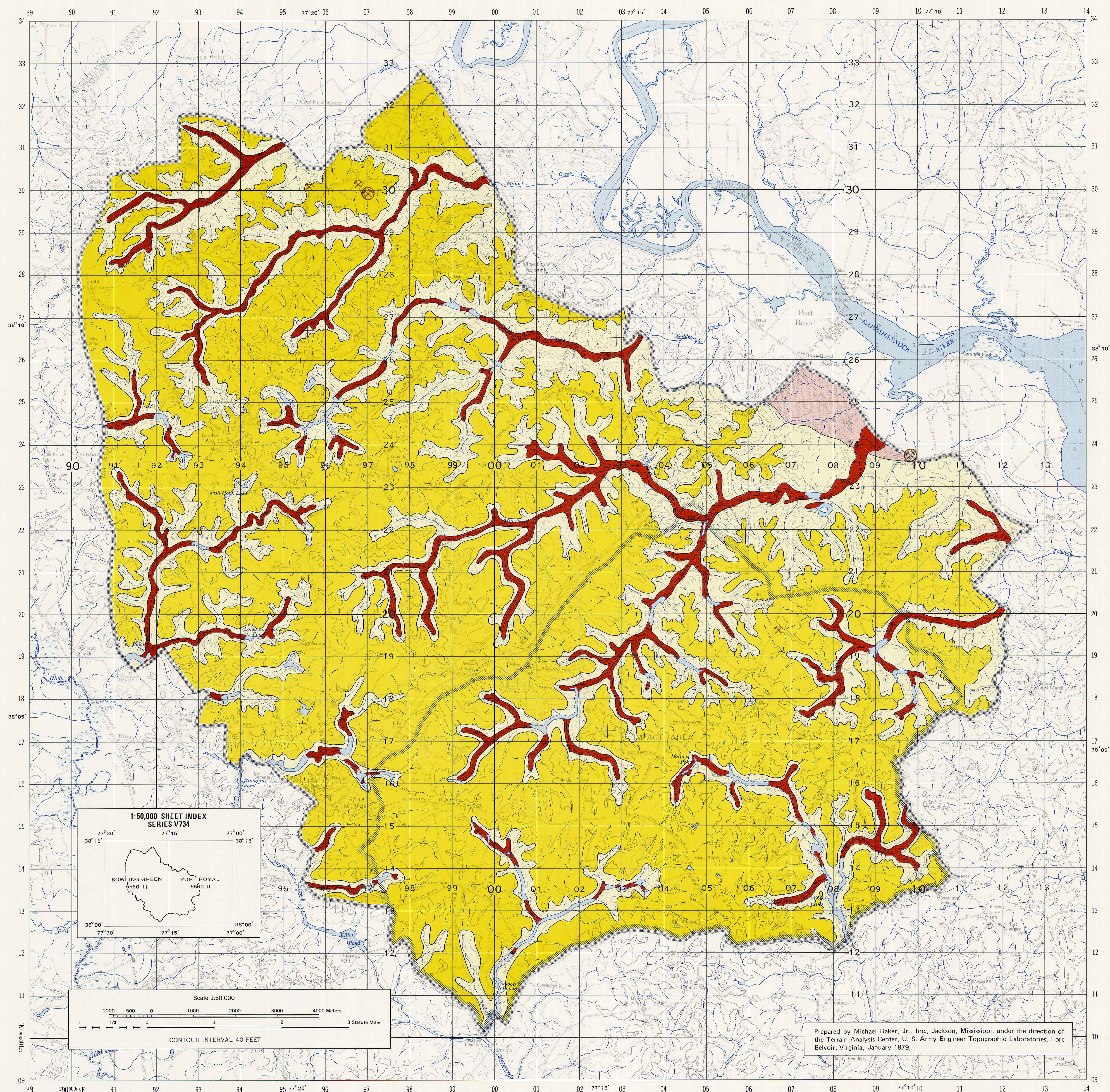
- ¹ These are typical average layers of the soils. Actual thickness and composition may vary considerably from those shown. Classification is the Unified Soil Classification System (USCS).
- ² Soils that have nearly similar characteristics are mapped as a soil series. The series is the common name of the soil. Each series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Many other minor soils are included in the map unit.

DEFINITIONS OF RATING TERMS

| | | |
|----------|---|---|
| Slight | - | relatively free of limitations, or limitations are easily overcome. |
| Moderate | - | limitations can be overcome with good planning and/or careful design. |
| Severe | - | limitations are serious and are difficult to overcome. |

SOIL CHARACTERISTICS AFFECTING RATINGS

c - clayey
e - excessive permeability
f - flooding
l - low bearing strength
r - restricted permeability
s - slope
v - volume change (shrink-swell)
w - wetness



FORT A.P. HILL, VIRGINIA TERRAIN ANALYSIS

ENGINEERING SOILS

- 1. Well-drained sandy soils.
- 2. Loamy gravelly sand and clay soils.
- 3. Poorly drained sandy clay and silt.
- 4. Well to poorly drained sandy clay loam.
- X Existing Borrow Pits (sandy gravel).
- X Potential Borrow Sites.

NOTE: Number refers to entry in table.

E. ENGINEERING GEOLOGY

Fort A. P. Hill lies within the Coastal Plain physiographic province. Only three geologic formations outcrop on the reservation; all are Quaternary and Tertiary unconsolidated sands, clays, and silts that slope gently seaward at a rate of about 3 meters (10 feet) per mile. These formations are underlain by additional Tertiary and Cretaceous coastal plain sediments that lie on granitic and metamorphic rocks (see sketch, below).

The predominant surface material of the Fort A. P. Hill area is the Columbia Group of light-colored silty and clayey sands. These sands average 15 meters (50 feet) in thickness and cover the entire area except in streams and valleys where erosion has cut through to the underlying formations. The Columbia sands have few limitations to most engineering uses.

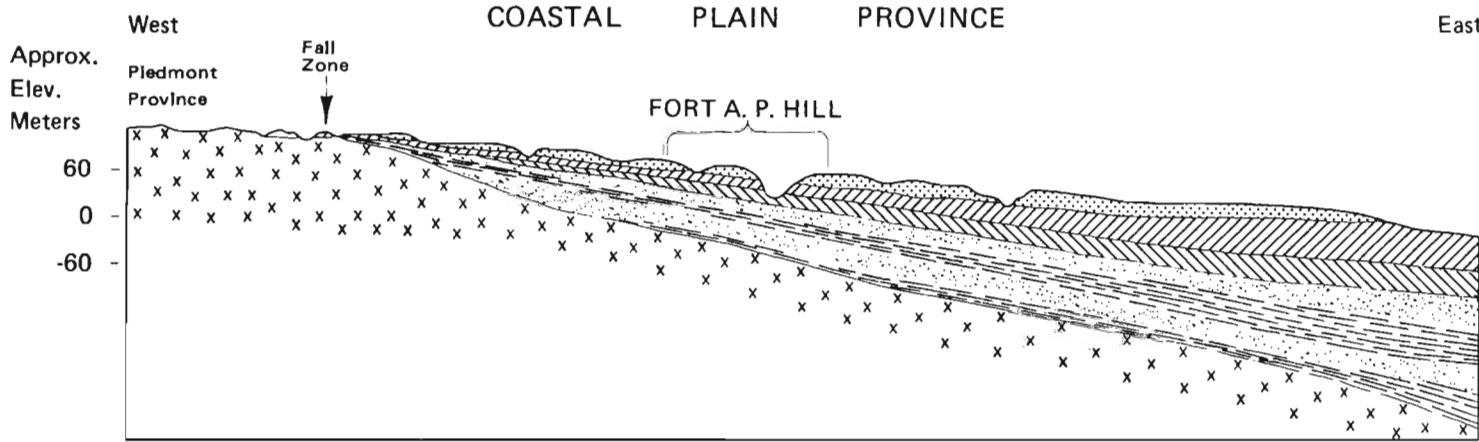
Immediately under the Columbia sands and exposed in all of the deeper valleys and side slopes is the Calvert Formation of Tertiary age. It is composed of greenish-brown clays and silts, and is exposed on moderately steep to steep slopes. It has numerous limitations for most engineering uses.

The Nanjemoy Formation, also of Tertiary age, underlies the Calvert Formation and has limited outcrop along the Rappahannock River flood plain and lower side slopes, as well as for a short distance up the bottoms of two adjacent stream valleys (see sketch, below). It is composed of dark-gray, semi-consolidated, quartz-glaucconite sands and marls. Because of its small outcrop area, located only along the edge of the reservation, it is of limited importance in military planning.

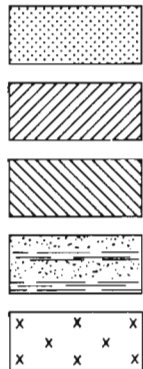
A few thin deposits of gravel have been concentrated by erosion along some of the slopes in the northwestern corner of the reservation. Small deposits of sandy gravel occur in river terraces near Cooke Campsite. Fine sand with local variation in the amount of included silt or clay is available throughout the area.

| UNIT | TOPOGRAPHY | ROCK DESCRIPTION | ENGINEERING EVALUATIONS | EXCAVATION FACTORS | PITS AND QUARRIES |
|--|---|---|---|--|--|
| Fine sand with mixed silt and clay. | Level and gently rolling to rolling remnants of upland plain. Most of the unit has relief favorable for construction. | Mixed and layered deposits of light-colored silty and clayey sand. Thicknesses average 15 m (50 ft) but range to 37 m (120 ft). | Well suited for numerous types of engineering construction but contains only fine sand and a small amount of gravel for construction materials. | Excavation easy with ordinary hand tools or power equipment. Excavation slopes stable if flatter than angle of repose, trenches or steep slopes in cohesionless sand subject to slump. | Sandy gravel has been taken from borrow pits near grid coordinates 970299. Potential borrow pits do exist in the vicinity of grid coordinates 968301 and 956301 (see Engineering Soils map). |
| | Relief ranges from 3 to 15 m (10 to 50 ft). Elevations range from 37 m (120 ft) near Cooke Camp to 78 m (255 ft) east of Widewake near the western edge of the reservation. | Sand is fine grained with grain size increasing to northwest. Locally, erosion has concentrated gravel on lower surfaces in northwest corner of reservation. | Flat to gently rolling upland plain that has been dissected by a dendritic drainage, leaving numerous areas of limited width and extent available for multi-structure emplacement. | | |
| | The surface has been intensely dissected by numerous short drains which have narrow valleys, moderately steep sides, and flat valley floors. The drainage pattern is strongly dendritic. | Unit is the Quaternary Columbia Group and is fluvial in origin. | Alinements available for highways, railroads, and airfields are short straight lengths and long curving lengths. The flat dissected sandy surface provides easy grading with minimum cut and fill required if drainage divides are followed. | | |
| Clays and silty clays. | Gentle to very steep slopes and narrow to moderately wide valleys with flat valley floors. Much terrain is not suitable for construction sites because of steep slopes and wet valley floors. | Semi-consolidated layers of clay with some silty and sandy clay. Thicknesses average 14 m (47 ft). | Generally unsuited for engineering construction except for sewage lagoons, ponds, and uses requiring impermeable clay material. | Excavation is easy with power equipment and moderately easy with hand tools. Excavation slopes stable when cut but will weather rapidly to flatter angle. | No deposits have been worked for clay. Insufficient data exist to determine potential borrow areas. |
| | Relief ranges from 2 to 15 m (7 to 50 ft). Elevations range from 12 to 58 m (40 to 190 ft). Unit is overlain by Columbia sands and outcrops only on side slopes and in drainageways where exposed by erosion of overlying unit. | Clays and silty clays are drab greenish brown. Plant fragments and mollusks common. Diatomaceous silty clay often occurs near middle of section. Has coarse basal quartz sand member. | Rolling to steep terrain and flat stream bottoms. The area available or suitable for multi-structure emplacements is severely limited by the slope and danger of flooding. | | |
| | Drainage pattern is intensely dendritic. Stream alinements are predominantly straight with some meandering in the lower reaches. | Surface of slopes often has 1 to 2 m (3 to 7 ft) of sand overburden eroded down from Columbia Group above. | Alinements available are short and curving with grades from 8 to 15 percent, requiring substantial cut and fill. Cut slopes stand well but erode rapidly unless drainage is controlled. Stream crossings have soft footings and usually require culverts. Beaver dams frequently plug culverts, causing over-bank flow. | | |
| Silty clay loam, silty quartz-glaucconite sands, alluvium. | Flat to gently rolling bottom-land river terraces. Most of the unit has relief favorable for construction. | Unit is the Tertiary Calvert Formation and is marine in origin. | Most of existing access routes avoid unit. Those crossing it have steep grades, are subject to flooding, and are slick when wet unless surfaced with other material. | Excavation is easy with ordinary hand tools or power equipment. Excavation slopes tend to slump and erode rapidly. | Sand and sandy gravel have been taken from borrow pit near grid coordinates 098237. Potential borrow pit exists in the vicinity of grid coordinates 067196 (see Engineering Soils map). |
| | Relief ranges from 1 to 12 m (3 to 40 ft). Elevations range from 3 m (10 ft) on Mill Creek to 18 m (60 ft) near Cooke Campsite. Unit outcrops only along Rappahannock River and for a short distance up two tributaries. | Silty clay loam and alluvium over semi-consolidated quartz-glaucconite sands. Thickness of unit averages 15 m (50 ft). | Foundation sites limited by steep slopes. Saturated soils may be a problem in valley bottoms. Foundations for large structures often will require pilings on deep footings. | | |
| | Drainage pattern on flood plain is undefined. Low-gradient streams have meanders. Unit is lowest area on the reservation. | Sands are dark gray with shell beds common. Soil overburden is yellowish and sandy clay loam that ranges from 1 to 3 m (3 to 10 ft) in thickness. | Poor source of construction material other than as fill and as clay sealer for dams and ponds; possible source of clay for bricks and tile. | | |
| | | Small river terrace deposits near Millers Pond contain silty, sandy gravel. | Unsuitable for solid and liquid waste disposal because of poor permeability; excellent for sewage lagoons, where a low percolation rate is required. | | |
| | | Unit is the Tertiary Nanjemoy Formation and is marine in origin. | Provides some small flood plain terrace deposits of sand and gravel. Major limitation of the unit is its small area. | | |
| | | | Consists of flat to gently rolling terrain which is available for multi-structure emplacement. High water table in part of unit is the major limitation for construction of roads, railroads, and airfields. Straight alinements are available with a minimum of cut-and-fill or grading. | | |
| | | | Seasonal high ground water table and the possibility of flooding are foundation limitations for buildings and roads. Provides good foundation for earth dams and ponds. | | |
| | | | Suitable source of fill material; will produce limited quantities of silty sand and gravel. | | |
| | | | Good to poor for the disposal of liquid and solid wastes; limited locally by flooding, seasonal high water tables, and often by low permeability. | | |

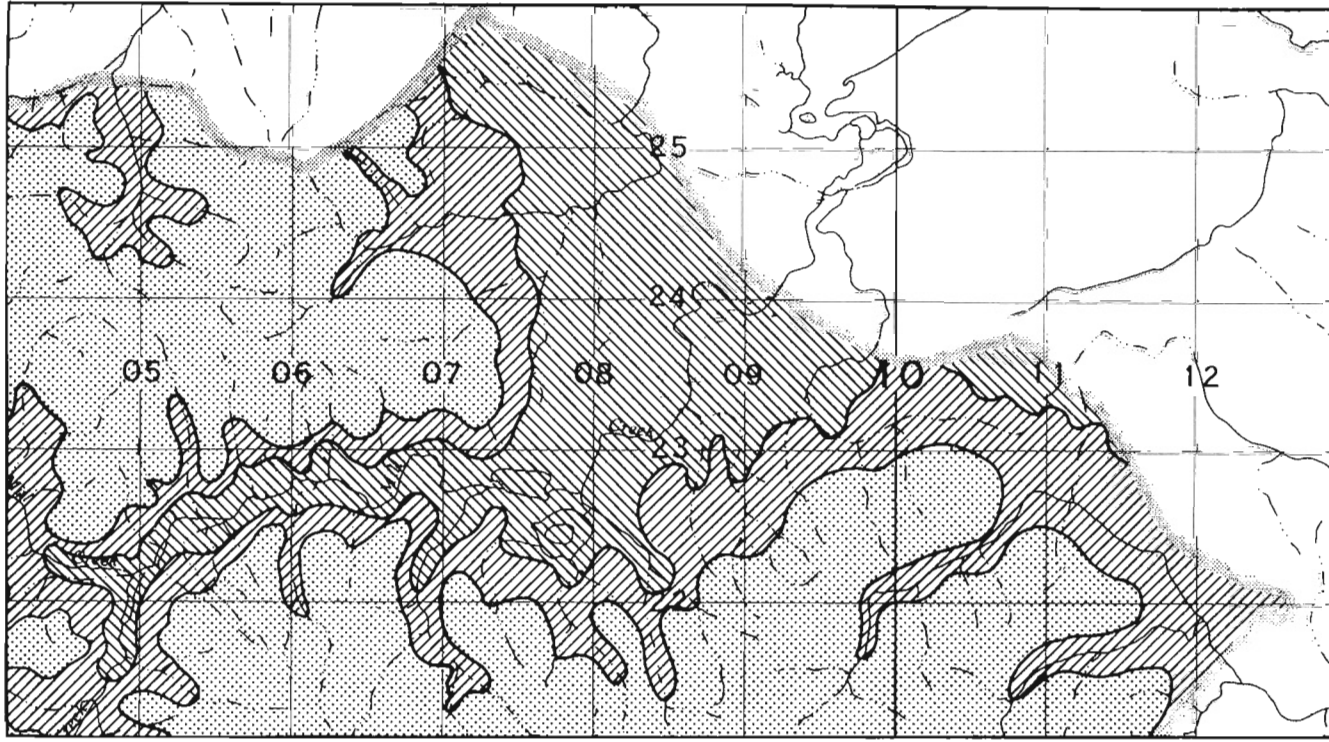
GENERALIZED GEOLOGIC SECTION, VIRGINIA



- Generalized Section
- Recent and Pleistocene terrace sands and gravels.
 - Miocene clays.
 - Eocene glauconitic sands and clays.
 - Cretaceous sands and clays.
 - Pre-Cambrian granitic basement rock.



REPRESENTATIVE GEOLOGY, FORT A. P. HILL



- Fort A. P. Hill
- Columbia Group sands.
 - Calvert Formation (Lower Miocene Chesapeake Group).
 - Nanjemoy Formation (Upper Eocene Pamunkey Group).

F. SPECIAL PHYSICAL PHENOMENA

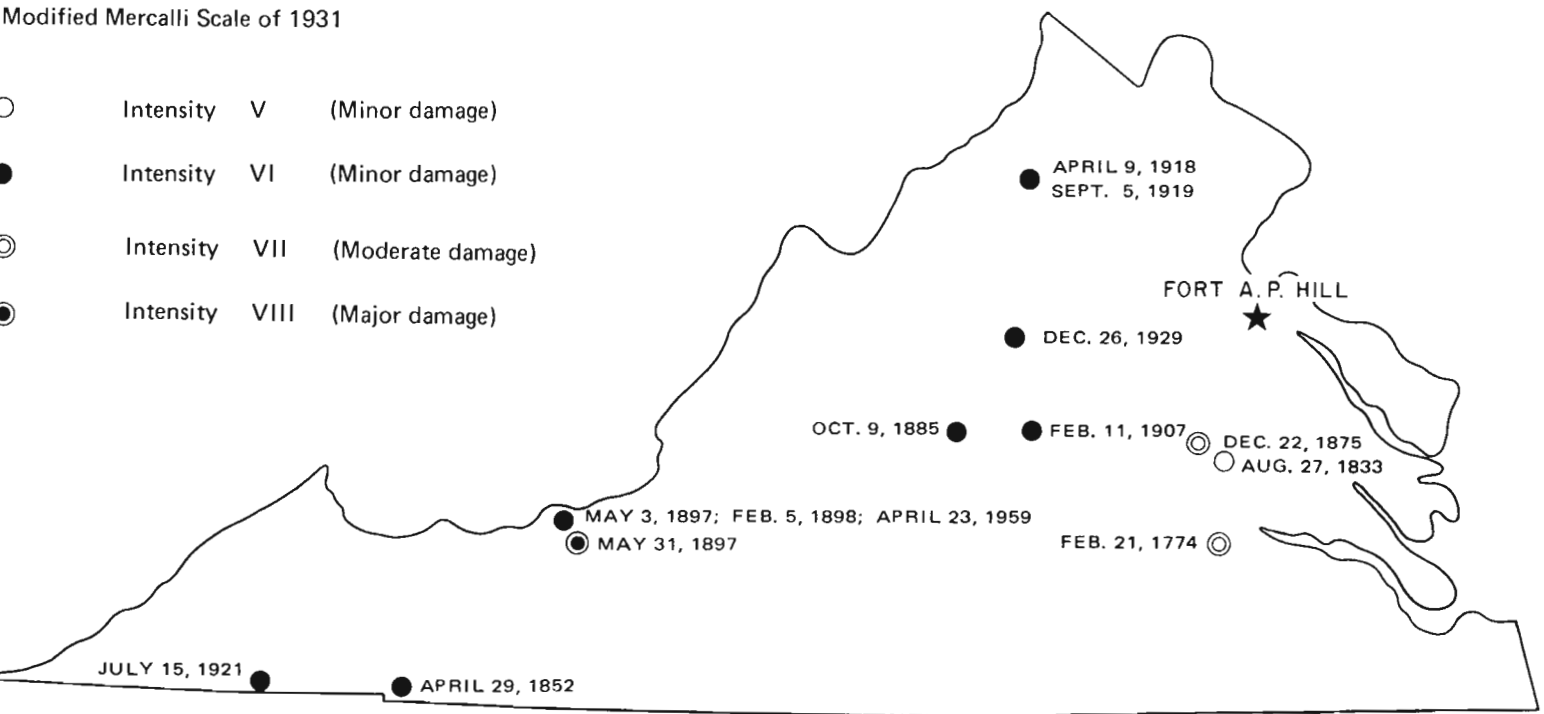
EARTHQUAKES

Fort A. P. Hill is in seismic-risk zone 1 (Uniform Building Code, 1976), with minor damage to some structures possible from earthquakes of intensities V and VI on the Modified Mercalli Scale of 1931.

One hundred and thirty-seven (137) shocks were recorded in Virginia between 1774 and 1970. Many of these were of intensities less than V and caused no damage. Thirty-five quakes, however, had intensities of V or greater; damage caused by these stronger quakes was limited to fallen chimneys, cracked brick walls, fallen plaster, and broken windows.

The strongest earthquake in Virginia, with the epicenter in Giles County, occurred on 31 May 1897. The intensity was VIII and the shock was felt in an area of about 750,000 square kilometers (289,575 square miles). It was especially strong at Pearisburg, where the walls of old brick houses were cracked and bricks were thrown from chimney tops. Springs were muddied and a few earth fissures appeared.

EPICENTERS OF SELECTED EARTHQUAKES OF INTENSITY V OR GREATER, VIRGINIA, 1774 - 1959



G. VEGETATION

Forests, scrub, grasslands, wetlands, and agricultural lands, are the five major vegetative types significant to military training at Fort A. P. Hill.

Forests, consisting of evergreen needleleaf and deciduous broadleaf trees, compose about 80 percent of the post land area. Evergreen needleleaf trees include loblolly pine, Virginia pine, and shortleaf pine. Loblolly pine is the favored species for management because of its very good growth rate, seed production, root system, and tendency to shed lower limbs. Deciduous broadleaf trees include primarily yellow poplar, white oak, northern red oak, sycamore, black gum, sweet gum, beech, hickory, and black walnut. Forest management favors yellow poplar, white oak and northern red oak in that order. Black walnut is considered a special species due to its high value and is very intensively managed around the old home sites. Fort A. P. Hill actively maintains an intensive Forest Management Program aimed at providing timber on a sustained yield basis, a desirable wildlife habitat, and recreational areas. Forest management activities include timber harvesting, reforestation and control of undesirable species. The post is divided into 35 management compartments. Six scattered compartments and one impact area compartment are harvested each year, maintaining a five year cutting cycle.

Low forests, consisting of evergreen needleleaf trees, compose about two percent of the post land area. The low forests are mainly loblolly pine plantations managed for timber production.

Scrub vegetation, consisting of evergreen needleleaf and deciduous broadleaf trees, composes about three percent of the post land area. Most of the evergreen needleleaf scrub is in loblolly pine plantations. Yellow poplar is prevalent in the deciduous broadleaf scrub followed by white oak and northern red oak. Timber harvested areas contain a mixture of evergreen needleleaf and deciduous broadleaf scrub.

Grasslands compose approximately six percent of the post land area. Grasses are classified as short, seldom reaching heights of one meter (three feet). Major species include fescue, bluegrass, bluestem, Johnson grass, broomsedge, crabgrass, Bermuda, and orchard grass.

Wetlands compose approximately seven percent of the post land area, consisting of perennially and seasonally water covered bottomlands. The sparse overstory of deciduous broadleaf trees include willow, river birch, basswood, sycamore, yellow poplar, ash, sweet gum, and water oak. Beaver are very active in these wetlands and maintain dams on most of the streams.

Agricultural lands compose less than one percent of the post land area. Crops on out-leased land include wheat, corn, and soybeans. A portion of the crops is left each season to provide feed for wildlife.

Open areas compose about one percent of the post land area. The open areas are built-up areas, barren areas, or heavily used areas.

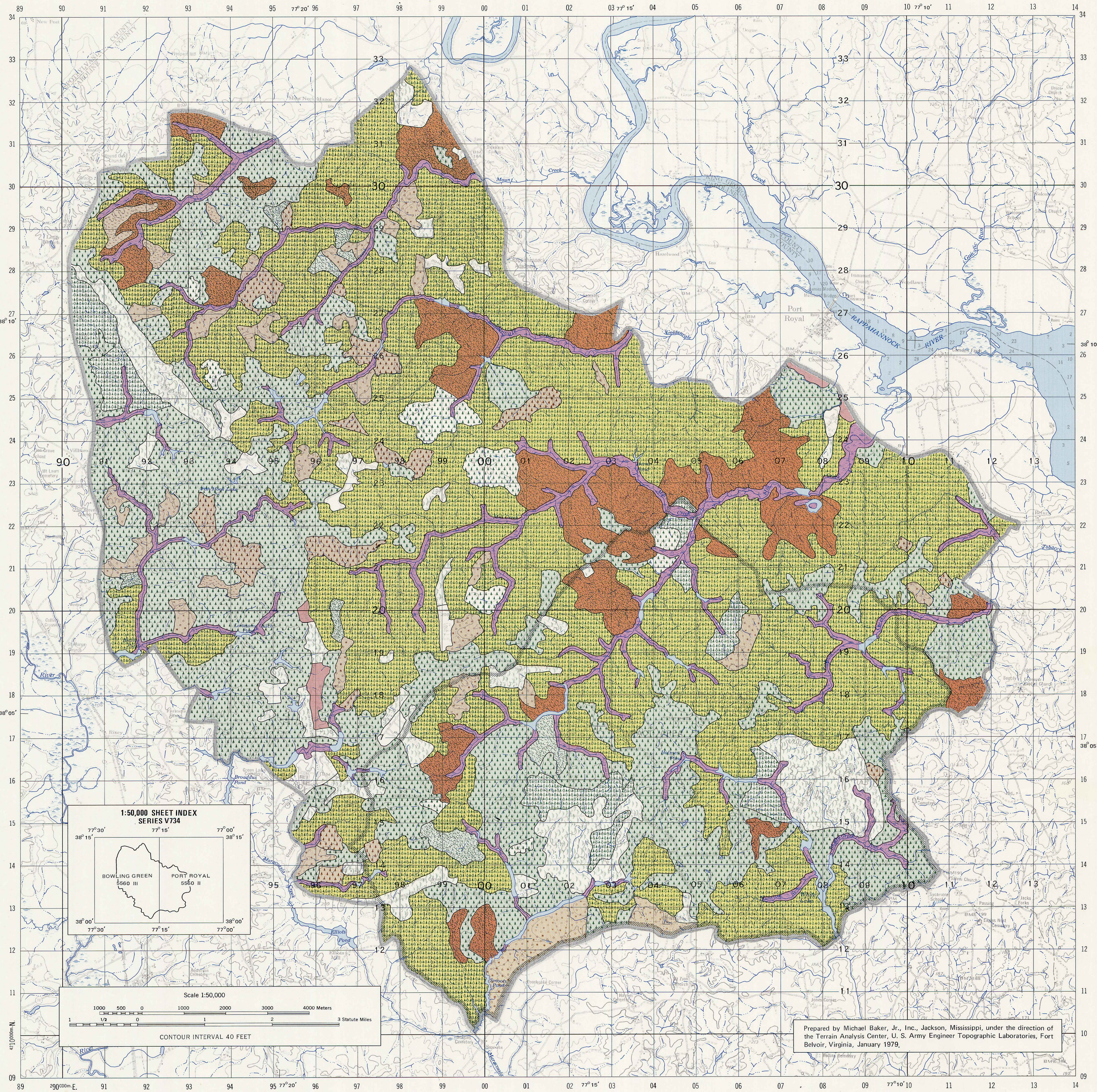
The vegetative types that afford the best cover for foot troops and vehicles are the dense evergreen needleleaf and dense deciduous broadleaf forests. Best concealment possibilities for foot troops and vehicles are the dense evergreen needleleaf forest year-round and dense deciduous broadleaf forest from mid-May through September. Vegetative types that afford the least concealment are deciduous broadleaf forests when leafless (October through mid-May), thinned timber stands, clear-cut areas, and grasslands.

The location and extent of vegetative types on Fort A. P. Hill are shown on the accompanying vegetation map. Descriptive details of each map unit are included in the table below.

| MAP UNIT | DESCRIPTION | DISTRIBUTION | REMARKS | COVER | CONCEALMENT |
|--|--|--|---|--|--|
| 1 Evergreen needleleaf trees; medium to dense spacing. | Evergreen needleleaf trees; 50 to 100% crown cover density; 75% or more of each stand composed of one or more evergreen needleleaf species; dominant species are loblolly and Virginia pine, occasionally interspersed with shortleaf pine; stem heights average over 10.6 m (35 ft); stem diameters generally over 15.2 cm (6 in); trees generally spaced 2.4 to 5.5 m (8 to 18 ft) apart. Undergrowth varies from medium to dense; height generally 1 m (3 ft) or less; undergrowth consists of young trees, honeysuckle, sweetbrier, blackberry, sumac, huckleberry and rhododendron. | Occurs throughout the reservation on the higher slopes and uplands; comprises approximately 26% of the reservation land area. | Mature trees are harvested on an annual basis in selected management compartments. Management practices include selective cutting, clear-cutting, prescribed burning and reforestation with loblolly pine. | Cover for foot troops from flat-trajectory fire of small arms is fair to good. | Concealment from aerial observation is good year-round for foot troops and fair to good for vehicles. Concealment from ground observation is good year-round for foot troops and fair to poor for vehicles. |
| 2 Evergreen needleleaf trees; nearly open to medium spacing. | Evergreen needleleaf trees; 10 to 50% crown cover density; 75% or more of each stand composed of one or more evergreen needleleaf species; dominant species is loblolly pine interspersed with Virginia and shortleaf pine; stem heights average over 10.6 m (35 ft); stem diameters generally over 15.2 cm (6 in); trees generally spaced 4.2 to 9.1 m (14 to 30 ft) apart. Undergrowth varies from sparse to dense; height generally 1 m (3 ft) or less; undergrowth consists of young trees, honeysuckle, sweetbrier, blackberry, sumac, huckleberry, rhododendron, ragweed, pokeberry, foxtail and partridge pea. | Widely scattered small stands occur throughout the reservation on the higher slopes and uplands; covers approximately 1% of the reservation land area. | Loblolly pine is the favored species and will be preserved while other pine species will be thinned out. Mature trees are harvested on an annual basis in selected management compartments. Management practices include thinning, clear-cutting, prescribed burning, and reforestation with loblolly pine. | Cover for foot troops from flat-trajectory fire of small arms is fair to good. | Concealment from aerial observation is fair to poor year-round for foot troops and poor for vehicles. Concealment from ground observation is fair year-round for foot troops and poor for vehicles. |
| 3 Deciduous broadleaf trees; medium to dense spacing. | Deciduous broadleaf trees; 50 to 100% crown cover density; 75% or more of each stand composed of one or more deciduous broadleaf species; dominant species are yellow poplar, red oak and white oak interspersed with sweet gum, black gum, hackberry, red maple, beech and black walnut; stem heights average over 10.6 m (35 ft); stem diameters generally over 22.9 cm (9 in); trees spaced 3.0 to 9.1 m (10 to 30 ft) apart. Undergrowth varies from medium to dense; height generally 1 m (3 ft) or less; undergrowth consists of young trees, honeysuckle, sweetbrier, blackberry, sumac, huckleberry and rhododendron. | Scattered throughout the reservation on the lower slopes and bottomlands; larger stands located in east central area; comprises approximately 8% of the reservation land area. | Mature trees are harvested on an annual basis in selected management compartments. Yellow poplar is the favored species and old deciduous stands containing yellow poplar are clear-cut to allow stored seed to germinate. | Cover for foot troops from flat-trajectory fire of small arms is fair to good. | Concealment from aerial observation is good for foot troops and vehicles when trees are in leaf (mid-May through September); during leafless season concealment is poor for foot troops and vehicles. Concealment from ground observation is fair year-round for foot troops; when trees are in leaf, concealment is fair for vehicles, but poor at other times. |
| 4 Deciduous broadleaf trees; nearly open to medium spacing. | Deciduous broadleaf trees; 10 to 50% crown cover density; 75% or more of each stand composed of deciduous broadleaf species; dominant species is yellow poplar interspersed with red oak, white oak, sweet gum, black gum, hackberry, red maple, beech, and black walnut; stem heights generally over 10.6 m (35 ft); stem diameters average over 22.9 cm (9 in); tree spacing 4.6 to 13.7 m (15 to 45 ft); sparse to dense undergrowth; height averages 1 m (3 ft) or less; undergrowth includes honeysuckle, sweetbrier, blackberry, sumac, huckleberry and rhododendron; foxtail, ragweed, pokeberry and mixed grasses occupy open areas. | Small stands scattered throughout the reservation on lower slopes and bottomlands; occupies about 1% of the reservation land area. | Mature trees are harvested on an annual basis in selected management compartments. Yellow poplar is preserved and less desirable hardwoods are thinned from these deciduous stands. | Cover for foot troops from flat-trajectory fire of small arms is fair to poor. | Concealment from aerial and ground observation is fair for foot troops when trees are in leaf (mid-May through September); during the leafless season concealment is poor for foot troops. Concealment from aerial and ground observation for vehicles is poor at all times. |
| 5 Mixed evergreen needleleaf and deciduous broadleaf trees; medium to dense spacing. | Mixed evergreen needleleaf and deciduous broadleaf trees; 50 to 100% crown cover density; each stand composed of one or more of the evergreen needleleaf and deciduous broadleaf species; dominant species are loblolly pine and yellow poplar interspersed with shortleaf pine, Virginia pine, red oak, white oak, sweet gum, black gum, hackberry, red maple, beech and hickory; stem heights average over 10.6 m (35 ft); stem diameters generally over 17.8 cm (7 in); tree spacing ranges 2.4 to 9.1 m (8 to 30 ft). Undergrowth generally medium density; height averages 1 m (3 ft) or less; undergrowth consists of young trees, honeysuckle, sweetbrier, blackberry, sumac, huckleberry and rhododendron. | Common throughout the reservation on lower plains and well-drained bottomlands; mostly in large stands; occupies 42% of the reservation land area. | Mature trees are harvested on an annual basis in selected management compartments. Loblolly pine and yellow poplar are preserved for regeneration. Management practices include selective thinning, clear-cutting, and prescribed burning. | Cover for foot troops from flat-trajectory fire of small arms is fair to good. | Concealment from aerial and ground observation is fair year-round for foot troops. Concealment from aerial and ground observation is fair to poor year-round for vehicles. |
| 6 Mixed evergreen needleleaf and deciduous broadleaf trees; nearly open to medium spacing. | Mixed evergreen needleleaf and deciduous broadleaf trees; 10 to 50% crown cover density; each stand composed of one or more of the evergreen needleleaf and deciduous broadleaf species; dominant species are loblolly pine and yellow poplar interspersed with shortleaf pine, Virginia pine, red oak, white oak, sweet gum, black gum, hackberry, red maple, beech and hickory; stem heights generally over 10.6 m (35 ft); stem diameters generally over 17.8 cm (7 in); tree spacing varies 4.6 to 13.7 m (15 to 45 ft). Undergrowth varies from sparse to dense; height averages 1 m (3 ft) or less; undergrowth consists of young trees, honeysuckle, sweetbrier, blackberry, sumac, huckleberry and rhododendron; ragweed, foxtail, pokeberry, partridge pea and mixed grasses occur in open areas. | Occurs in one large tract near the drop zone and in smaller tracts in the southern portion of the reservation; comprises about 3% of the reservation land area. | Mature trees are harvested on an annual basis in selected management compartments. Loblolly pine and yellow poplar are preserved for regeneration. Less desirable pines and hardwoods are thinned or clear-cut. | Cover for foot troops from flat-trajectory fire of small arms is fair to poor. | Concealment from aerial and ground observation is fair to poor year-round for foot troops. Concealment from aerial observation is poor year-round for vehicles. |
| 7 Evergreen needleleaf trees; uniform spacing in rows. | Evergreen needleleaf trees; 50% crown cover density in rows; each stand is composed primarily of evergreen needleleaf species; dominant species in these pine plantations is loblolly pine, occasionally interspersed with Virginia and shortleaf pine; stem heights generally less than 4.6 m (15 ft); stem diameters average 10.2 cm (4 in) or less; tree spacing in rows 2.4 to 4.6 m (8 to 15 ft); spacing between rows 2.4 to 4.6 m (8 to 15 ft). Undergrowth varies from sparse to medium density; height averages 1 m (3 ft) or less; undergrowth consists of honeysuckle, sweetbrier, blackberry, sumac, huckleberry and rhododendron. | Numerous small areas throughout the reservation; more prevalent in western and northern portions; comprises 2% of the reservation land area. | Due to stem height this map unit does not fit in either the forest or scrub categories. In approximately ten years, tree growth will cause this unit to change to map unit one. | Cover for foot troops from flat-trajectory fire of small arms is poor. | Concealment from aerial and ground observation is fair year-round for foot troops and poor year-round for vehicles. |
| 8 Deciduous broadleaf scrub; medium to dense spacing. | Deciduous broadleaf scrub; 50 to 100% crown cover density; each stand composed of one or more deciduous broadleaf species; dominant species is yellow poplar interspersed primarily with red oak and white oak; stem heights generally less than 4.6 m (15 ft); stem diameters average less than 15.2 cm (6 in); tree spacing varies 3.0 to 9.1 m (10 to 30 ft). Undergrowth varies from sparse to dense; height averages 1 m (3 ft) or less; undergrowth consists of young trees, honeysuckle, sweetbrier, blackberry, sumac, huckleberry and rhododendron. | Few small areas located in northwestern corner of reservation; comprises less than 1% of the reservation land area. | Deciduous broadleaf scrub occurs on land that has been clear-cut and burned. Reforestation is generally by natural regeneration. | Cover for foot troops from flat-trajectory fire of small arms is poor. | Concealment for foot troops is fair from aerial and ground observation when trees are in leaf (mid-May through September); during the leafless season concealment for foot troops is poor. Concealment from aerial and ground observation is poor year-round for vehicles. |
| 9 Mixed evergreen needleleaf and deciduous broadleaf scrub; medium to dense spacing. | Mixed evergreen needleleaf and deciduous broadleaf scrub; 50 to 100% crown cover density; each stand composed of one or more evergreen needleleaf and deciduous broadleaf species; dominant species are loblolly pine and yellow poplar interspersed primarily with shortleaf pine, Virginia pine, red oak and white oak; stem heights generally less than 4.6 m (15 ft); stem diameters generally less than 15.2 cm (6 in); tree spacing averages 3.0 to 9.1 m (10 to 30 ft). Undergrowth varies from sparse to dense; height averages 1 m (3 ft) or less; undergrowth consists of young trees, honeysuckle, sweetbrier, blackberry, sumac, huckleberry and rhododendron. | Scattered small areas throughout the reservation; comprises about 3% of the reservation land area. | Mixed evergreen needleleaf scrub and deciduous broadleaf scrub occur in clear-cut areas. Reforestation is by natural regeneration, seeding, or seedling planting. | Cover for foot troops from flat-trajectory fire of small arms is fair. | Concealment for foot troops from aerial or ground observation is fair year-round. Concealment for vehicles from aerial or ground observation is poor year-round. |
| 10 Short grasses. | Short grasses; mixed species, including fescue, bluegrass, bluestem, red top, rye, oats, foxtail, crowfoot, crabgrass, broomsedge, quackgrass, Johnson grass and orchard grass; heights generally less than 1 m (3 ft); may include scattered trees, not to exceed 10% crown cover density. | Large areas located in the drop zone and impact area; numerous small areas scattered throughout the reservation; comprises 6% of the reservation land area. Numerous small barren and heavily used areas exist in this unit. | Many areas are kept closely mowed. Grassed areas in the impact area are burned periodically for fire control; some other small areas are also burned for wildlife habitat improvement. | No cover from flat-trajectory fire of small arms for foot troops. | Concealment from ground observation is poor for foot troops and nonexistent for vehicles. Concealment from aerial observation for foot troops and vehicles is nonexistent. |

G. VEGETATION (Continued)

| MAP UNIT | DESCRIPTION | DISTRIBUTION | REMARKS | COVER | CONCEALMENT |
|--|---|---|--|--|---|
| 11 Field crops; corn, wheat, and soybeans. | Field crops; corn, wheat and soybeans; height generally 0.6 to 2.0 m (2 to 6.5 ft). | Two areas on leased out lands north-east of Cooke Camp and along reservation Route 608 north of Post Headquarters; comprises less than 1% of the reservation land area. | Agricultural practices are employed similar to those used throughout Virginia, ie., a 2 year crop cycle. The growing season averages 220 days. (Average last killing frost April 4; average first killing frost October 11.) | No cover from flat-trajectory fire of small arms for foot troops. | Concealment for foot troops from aerial and ground observation is poor. Concealment for vehicles from aerial or ground observation is nonexistent. |
| 12 Swamps; wet areas with over 50% trees. | Swamps; wet areas with over 50% trees; dominant deciduous broad-leaf trees include willow, river birch, basswood, sycamore, yellow poplar, ash, sweet gum and water oak; stem heights average about 10.6 m (35 ft); stem diameters generally 10.2 to 61.0 cm (4 to 24 in); tree spacing is extremely variable generally 4.5 to 15.2 m (15 to 50 ft). Undergrowth varies from sparse to dense; height generally 0.6 to 1.2 m (2 to 4 ft); undergrowth consists of alder, grape, greenbrier, sourwood, sweetbay, honeysuckle and young trees. | Common on seasonally wet lands and in stream bottoms throughout the reservation; comprises about 7% of the reservation land area. | Numerous manmade dams and beaver ponds exist in the stream bottoms causing shallow flooding. These lands have limited use for military operations. Stream crossing by vehicular traffic is limited to culverts and bridges. | Cover for foot troops from flat-trajectory fire of small arms is poor. | Concealment for foot troops from aerial and ground observation is fair when trees are in leaf (mid-May through September) and poor all other times. Concealment for vehicles from aerial and ground observation is poor year-round. |



FORT A.P. HILL, VIRGINIA TERRAIN ANALYSIS

VEGETATION

| | | | |
|--------------------|---|---------------------------|--|
| FORESTS | | SCRUB | |
| | 1. Evergreen needleleaf trees; medium to dense spacing. | | 8. Deciduous broadleaf scrub; medium to dense spacing. |
| | 2. Evergreen needleleaf trees; nearly open to medium spacing. | | 9. Mixed evergreen needleleaf and deciduous broadleaf scrub; medium to dense spacing. |
| | 3. Deciduous broadleaf trees; medium to dense spacing. | GRASSLANDS | |
| | 4. Deciduous broadleaf trees; nearly open to medium spacing. | | 10. Short grasses. |
| | 5. Mixed evergreen needleleaf and deciduous broadleaf trees; medium to dense spacing. | AGRICULTURAL LANDS | |
| | 6. Mixed evergreen needleleaf and deciduous broadleaf trees; nearly open to medium spacing. | | 11. Field crops; corn, wheat, and soybeans. |
| LOW FORESTS | | WETLANDS | |
| | 7. Evergreen needleleaf trees; uniform spacing in rows. | | 12. Swamps; wet areas with over 50% trees. |
| | | OPEN | |
| | | | 13. Built-up areas; barren areas; and heavily used areas. Vegetation not a significant factor. |

NOTE: Number refers to entry in table.

H. CLIMATE

Fort A. P. Hill is situated at the upper edge of the coastal plain of Virginia, approximately 120.7 kilometers (75 miles) east of the Blue Ridge Mountains and 96.6 kilometers (60 miles) west of the Chesapeake Bay. It is geographically located in the transition zone between the northern and southern climates of the country.

The climate is a modified continental, with mild winters and warm and humid summers. The mountains to the west and the nearby Rappahannock River, along with the Chesapeake Bay and Atlantic Ocean to the east, are major factors controlling the climate. The mountains act as a partial barrier to incursions of cold, continental air in winter, and the open waters of the Chesapeake Bay and Atlantic Ocean, which are slow in reflecting atmospheric changes, contribute to the humid summers and mild winters.

Mean annual temperatures at Fort A. P. Hill average about 13.3° C (56° F). The coldest weather normally occurs in late December and January with an average low temperature of -4.7° C (23.5° F) and a high of 7.7° C (45.8° F). The temperature falls below freezing about 23 days a month during the winter and reaches -17.8° C (0° F) often enough to give an average of one day each year. Maximum temperature is below freezing on an average of seven days each year. July is the hottest month with an average daily maximum temperature of 31.7° C (89.1° F). Maximum temperatures up to 41.1° C (106° F) and minimum temperatures as low as 7.2° C (45° F) are the extremes during July and August. May and September are usually warm, each having an average of a few days with the temperature greater than or equal to 32.2° C (90° F).

The annual average of 1018 millimeters (40 inches) of precipitation is well distributed throughout the year, with the maximum in August and the minimum in February. Rainfall in summer is mainly associated with showers and thunder-showers. Some thunderstorm activity can be expected in the area on an average of 40 days a year. In winter some of the precipitation usually occurs as snow. The average snowfall is 406 millimeters (16 inches) a year, but yearly amounts are extremely variable, ranging from almost none up to 1070 millimeters (42 inches).

Southwest winds predominate, but during the cold months the winds are mainly from the north to northwest. On a daily basis, relative humidity tends to vary inversely with temperature, being high in the morning and low in the afternoon. Seasonally, relative humidity at Fort A. P. Hill does not vary markedly, but it is generally lowest in April and highest in September. The highest percentage (about 40 percent) of fair days, with cloud cover of three-tenths or less, occurs in October and November, and the lowest percentage (about 23 percent) is seen in mid-summer; however, the seasonal variations in cloudiness are not pronounced. Hurricanes occasionally move far enough inland to affect the area, but usually at reduced intensity. Tornadoes are also infrequent with a very few occurring in Virginia each year. Thunderstorms, accompanied by severe lightning, high wind and hail, are much more frequent and produce the greatest amount of storm damage.

CLIMATIC SUMMARY *

FORT A. P. HILL, VIRGINIA LATITUDE 38°07'N LONGITUDE 77°15'W ELEVATION 61.6M (202FT)

| PARAMETER DESCRIPTION | | UNIT OF MEASURE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL | YEARS OF RECORD | |
|---|---------------------|--------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|-----------------------|-----------------|----|
| Absolute Maximum Temperature | | °C °F | 25.6 78.0 | 29.4 85.0 | 31.1 88.0 | 36.1 97.0 | 36.7 98.0 | 39.4 103.0 | 40.0 104.0 | 40.0 104.0 | 41.1 106.0 | 36.1 97.0 | 31.7 89.0 | 26.1 79.0 | 41.1 106.0 | 29 | |
| Mean Daily Maximum Temperature | | °C °F | 7.7 45.8 | 9.2 48.5 | 14.0 57.2 | 20.6 69.1 | 25.7 78.3 | 29.8 85.6 | 31.7 89.1 | 30.7 87.3 | 27.5 81.5 | 21.8 71.2 | 15.6 60.1 | 8.9 48.1 | 20.3 68.5 | 29 | |
| Mean Daily Minimum Temperature | | °C °F | -4.7 23.5 | -3.9 25.0 | 0.0 32.0 | 5.6 42.1 | 11.2 52.2 | 15.8 60.4 | 18.2 64.8 | 17.1 62.8 | 13.4 56.2 | 6.9 44.4 | 1.2 34.1 | -3.6 25.5 | 6.4 43.6 | 29 | |
| Absolute Minimum Temperature | | °C °F | -21.7 -7.0 | -20.6 -5.0 | -16.1 3.0 | -6.7 20.0 | -2.2 28.0 | -4.4 40.0 | 8.9 48.0 | 7.2 45.0 | -1.1 30.0 | -6.1 21.0 | -15.6 4.0 | -20.6 -5.0 | -21.7 -7.0 | 29 | |
| Mean Number Days Maximum Temperature ≥ 32.2° C (90° F) | | days | 0.0 | 0.0 | 0.0 | 1.0 | 3.0 | 10.0 | 15.0 | 12.0 | 5.0 | 1.0 | 0.0 | 0.0 | 47.0 | 29 | |
| Mean Number Days Minimum Temperature ≤ 0.0° C (32° F) | | days | 25.0 | 22.0 | 18.0 | 5.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 4.0 | 15.0 | 24.0 | 113.0 | 29 | |
| Normal Heating Degree Days (Base 18.3° C/65° F) | | °C days °F days | 510.0 918.0 | 440.0 792.0 | 351.1 632.0 | 159.4 287.0 | 47.2 85.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 15.6 28.0 | 134.4 242.0 | 300.0 540.0 | 485.6 874.0 | 2443.3 4398.0 | 29 | |
| Normal Cooling Degree Days (Base 18.3° C/65° F) | | °C days °F days | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 4.4 8.0 | 48.9 88.0 | 135.0 243.0 | 205.0 369.0 | 173.9 313.0 | 78.9 142.0 | 13.9 25.0 | 0.0 0.0 | 0.0 0.0 | 660.0 1188.0 | 29 | |
| Mean Dew Point Temperature | | °C °F | -2.2 28.0 | -1.7 29.0 | 0.0 32.0 | 6.1 43.0 | 12.2 54.0 | 16.7 62.0 | 19.4 67.0 | 19.4 67.0 | 16.1 61.0 | 10.0 50.0 | 2.8 37.0 | -1.7 29.0 | 8.3 47.0 | 12 | |
| Mean Monthly Precipitation | | mm in | 72.14 2.84 | 64.01 2.52 | 90.93 3.58 | 72.90 2.87 | 86.61 3.41 | 80.26 3.16 | 111.25 4.38 | 120.65 4.75 | 84.33 3.32 | 78.99 3.11 | 74.93 2.95 | 81.28 3.20 | 1018.29 40.09 | 29 | |
| Absolute Maximum Monthly Precipitation | | mm in | 151.38 5.96 | 145.80 5.74 | 158.75 6.25 | 145.80 5.74 | 231.65 9.12 | 151.89 5.98 | 411.48 16.20 | 349.00 13.74 | 251.46 9.90 | 366.78 14.44 | 165.35 6.51 | 179.58 7.07 | 1918.97 75.55 | 29 | |
| Absolute Minimum Monthly Precipitation | | mm in | 10.41 0.41 | 9.14 0.36 | 26.92 1.06 | 14.99 0.59 | 16.26 0.64 | 15.75 0.62 | 18.80 0.74 | 12.95 0.51 | 10.16 0.40 | 3.56 0.14 | 17.02 0.67 | 10.67 0.42 | 392.18 15.44 | 29 | |
| Mean Number Days Precipitation ≥ 2.54 mm (0.1 in) | | days | 6.0 | 6.0 | 7.0 | 6.0 | 7.0 | 6.0 | 7.0 | 6.0 | 5.0 | 5.0 | 5.0 | 6.0 | 72.0 | 29 | |
| Mean Number Days With Thunderstorms | | days | 0.0 | 0.0 | 2.0 | 3.0 | 6.0 | 8.0 | 10.0 | 7.0 | 3.0 | 1.0 | 0.0 | 0.0 | 40.0 | 54 | |
| Mean Monthly Snowfall | | mm in | 121.9 4.8 | 99.1 3.9 | 88.9 3.5 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 12.7 0.5 | 81.3 3.2 | 403.9 15.9 | 29 | |
| Absolute Maximum Monthly Snowfall | | mm in | 739.1 29.1 | 584.2 23.0 | 533.4 21.0 | 12.7 0.5 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 0.0 0.0 | 279.4 11.0 | 368.3 14.5 | 1074.4 42.3 | 29 | |
| Mean Number Days Snowfall ≥ 38.1 mm (1.5 in) | | days | 1.5 | 0.4 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.7 | 3.5 | 11 | |
| Mean Relative Humidity | (at 0100 LST) | % | 77.0 | 74.0 | 73.0 | 74.0 | 83.0 | 87.0 | 89.0 | 90.0 | 90.0 | 87.0 | 80.0 | 78.0 | 82.0 | 43 | |
| | (at 0700 LST) | % | 81.0 | 79.0 | 78.0 | 75.0 | 79.0 | 82.0 | 85.0 | 88.0 | 89.0 | 89.0 | 84.0 | 81.0 | 83.0 | 43 | |
| | (at 1300 LST) | % | 57.0 | 52.0 | 48.0 | 45.0 | 50.0 | 53.0 | 56.0 | 57.0 | 56.0 | 53.0 | 50.0 | 55.0 | 53.0 | 43 | |
| | (at 1900 LST) | % | 69.0 | 62.0 | 59.0 | 55.0 | 65.0 | 68.0 | 72.0 | 76.0 | 79.0 | 77.0 | 70.0 | 70.0 | 68.0 | 43 | |
| Percent Frequency Surface Wind Speed ≥ 28 knots (51.9 kmph/32.2 mph) | | % | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 12 | |
| Percent Frequency Surface Wind Speed ≥ 17 knots (31.5 kmph/19.6 mph) | | % | 1.7 | 2.1 | 2.3 | 2.0 | 0.5 | 0.3 | 0.2 | 0.5 | 0.8 | 0.6 | 0.8 | 1.0 | 1.1 | 12 | |
| Fastest One-Mile Wind Speed | | kts kmph mph | 37.4 69.2 43.0 | 39.1 72.4 45.0 | 36.5 67.6 42.0 | 34.8 64.4 40.0 | 39.1 72.4 45.0 | 45.2 83.7 52.0 | 48.7 90.1 56.0 | 46.9 86.9 54.0 | 39.1 72.4 45.0 | 59.1 109.4 68.0 | 33.0 61.2 38.0 | 34.8 64.4 40.0 | 59.1 109.4 68.0 | 27 | |
| Mean Number Days Surface Wind Speed ≥17 knots (31.5 kmph/19.6 mph) and No Precipitation | (at 1900 LST) | days | 0.2 | 0.3 | 0.4 | 0.3 | 0.1 | 0.2 | 0.0 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 2.1 | 12 | |
| | (at 0100 LST) | days | 0.3 | 0.3 | 0.3 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.2 | 0.1 | 0.2 | 0.2 | 1.8 | 12 | |
| | (at 0700 LST) | days | 0.2 | 0.3 | 0.4 | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.2 | 0.1 | 1.6 | 12 |
| | (at 1300 LST) | days | 1.4 | 1.2 | 1.4 | 1.2 | 0.2 | 0.1 | 0.1 | 0.0 | 0.2 | 0.3 | 0.2 | 0.9 | 7.2 | 12 | |
| Mean Number Days Surface Wind Speed 4–10 knots (7.4-18.5 kmph or 4.6-11.5 mph) and Temperature 0.6-31.7° C (33-89° F) and No Precipitation | (at 1900 LST) | days | 16.3 | 16.8 | 21.1 | 20.1 | 22.4 | 22.5 | 21.7 | 22.4 | 21.2 | 21.4 | 19.7 | 16.6 | 242.2 | 12 | |
| | (at 0100 LST) | days | 12.2 | 13.1 | 18.1 | 20.0 | 20.5 | 20.2 | 21.3 | 20.4 | 18.8 | 19.6 | 18.2 | 12.5 | 214.9 | 12 | |
| | (at 0700 LST) | days | 10.6 | 10.8 | 15.6 | 21.6 | 21.2 | 23.2 | 22.4 | 21.6 | 19.8 | 20.4 | 16.0 | 10.9 | 214.1 | 12 | |
| | (at 1300 LST) | days | 15.4 | 16.7 | 16.6 | 16.0 | 20.9 | 17.2 | 15.2 | 19.8 | 20.9 | 22.7 | 20.7 | 19.6 | 221.7 | 12 | |
| Mean Number Days with Occurrence Visibility ≤ 0.8 km (0.5 mi) | | days | 2.4 | 2.7 | 1.6 | 1.5 | 2.0 | 1.3 | 1.5 | 2.7 | 3.6 | 3.8 | 2.6 | 2.6 | 28.3 | 12 | |
| Percent Frequency Ceiling ≤1524 m (5000 ft) or Visibility ≤ 8.0 km (5 mi) | | % | 29.1 | 28.4 | 27.0 | 22.4 | 25.9 | 22.9 | 20.7 | 28.1 | 27.3 | 28.5 | 26.4 | 24.2 | 25.9 | 12 | |
| Percent Frequency Ceiling ≤ 457.2 m (1500 ft) or Visibility ≤ 4.8 km (3 mi) | (for 0000-0200 LST) | % | 17.1 | 17.9 | 15.1 | 12.2 | 15.7 | 9.2 | 6.9 | 12.3 | 14.5 | 12.8 | 13.7 | 13.8 | 13.4 | 12 | |
| | (for 0300-0500 LST) | % | 18.4 | 19.9 | 17.6 | 16.0 | 21.6 | 16.3 | 13.7 | 22.0 | 22.2 | 20.7 | 16.9 | 15.8 | 18.4 | 12 | |
| | (for 0600-0800 LST) | % | 17.5 | 21.8 | 17.6 | 16.7 | 20.0 | 17.3 | 15.8 | 27.8 | 25.1 | 28.0 | 19.1 | 16.7 | 20.3 | 12 | |
| | (for 0900-1100 LST) | % | 17.0 | 18.9 | 15.7 | 10.4 | 12.7 | 10.7 | 8.0 | 16.2 | 14.5 | 18.6 | 15.4 | 15.9 | 14.5 | 12 | |
| | (for 1200-1400 LST) | % | 15.1 | 14.7 | 11.7 | 7.5 | 8.0 | 5.1 | 4.3 | 6.9 | 7.2 | 10.5 | 9.7 | 13.2 | 9.5 | 12 | |
| | (for 1500-1700 LST) | % | 12.8 | 14.2 | 10.5 | 6.2 | 7.3 | 4.7 | 3.0 | 4.1 | 6.1 | 9.3 | 8.2 | 11.3 | 8.1 | 12 | |
| | (for 1800-2000 LST) | % | 13.5 | 14.2 | 11.7 | 7.3 | 8.2 | 5.6 | 2.8 | 5.2 | 7.8 | 9.1 | 8.3 | 11.9 | 8.8 | 12 | |
| | (for 2100-2300 LST) | % | 15.9 | 15.1 | 13.5 | 8.7 | 10.6 | 5.8 | 3.3 | 6.5 | 9.0 | 10.1 | 11.1 | 13.4 | 10.3 | 12 | |
| | (for 0000-0200 LST) | % | 3.9 | 6.0 | 2.7 | 1.9 | 4.8 | 1.2 | 0.7 | 2.1 | 3.7 | 2.9 | 4.2 | 4.6 | 3.2 | 12 | |
| | (for 0300-0500 LST) | % | 5.6 | 6.9 | 3.6 | 4.0 | 6.3 | 4.0 | 2.5 | 7.5 | 8.7 | 6.8 | 6.8 | 6.1 | 5.7 | 12 | |
| Percent Frequency Ceiling ≤ 91.4 m (300 ft) or Visibility ≤ 1.6 km (1 mi) | (for 0600-0800 LST) | % | 4.7 | 5.8 | 3.0 | 3.3 | 3.3 | 3.1 | 2.2 | 5.6 | 7.8 | 9.9 | 6.6 | 5.5 | 5.1 | 12 | |
| | (for 0900-1100 LST) | % | 2.5 | 3.6 | 2.2 | 0.5 | 0.4 | 0.1 | 0.1 | 0.2 | 0.6 | 1.3 | 2.4 | 3.6 | 1.5 | 12 | |
| | (for 1200-1400 LST) | % | 1.6 | 2.1 | 0.7 | 0.1 | 0.3 | 0.1 | 0.0 | 0.2 | 0.1 | 0.4 | 0.2 | 2.4 | 0.7 | 12 | |
| | (for 1500-1700 LST) | % | 2.1 | 1.7 | 0.9 | 0.3 | 0.2 | 0.2 | 0.1 | 0.2 | 0.0 | 0.3 | 0.7 | 2.1 | 0.7 | 12 | |
| | (for 1800-2000 LST) | % | 2.5 | 2.5 | 1.5 | 0.6 | 0.9 | 0.1 | 0.3 | 0.1 | 0.3 | 0.5 | 1.1 | 3.8 | 1.2 | 12 | |
| | (for 2100-2300 LST) | % | 3.7 | 4.3 | 2.1 | 0.6 | 1.7 | 0.2 | 0.3 | 0.5 | 0.7 | 1.7 | 2.0 | 3.6 | 1.8 | 12 | |
| | (at 1900 LST) | days | 10.7 | 10.5 | 10.8 | 8.3 | 7.8 | 7.9 | 7.2 | 9.6 | 12.2 | 13.6 | 12.6 | 13.2 | 124.4 | 12 | |
| | (at 0100 LST) | days | 13.1 | 11.3 | 13.1 | 13.7 | 12.2 | 13.7 | 13.1 | 12.8 | 15.2 | 16.7 | 15.5 | 14.9 | 165.3 | 12 | |
| | (at 0700 LST) | days | 9.5 | 8.4 | 11.3 | 9.3 | 9.3 | 11.3 | 9.7 | 9.9 | 10.0 | 11.5 | 10.9 | 10.4 | 121.5 | 12 | |
| | (at 1300 LST) | days | 8.5 | 8.1 | 7.4 | 6.7 | 4.7 | 4.1 | 4.5 | 4.4 | 7.6 | 11.8 | 9.3 | 9.8 | 86.9 | 12 | |
| Mean Number Days Ceiling ≥ 304.8 m (1000 ft) and Visibility ≥ 4.8 km (3 mi) | (at 1900 LST) | days | 27.2 | 24.4 | 28.0 | 28.4 | 29.1 | 28.6 | 30.2 | 29.6 | 28.0 | 29.1 | 28.1 | 28.0 | 338.7 | 12 | |
| | (at 0100 LST) | days | 26.2 | 23.5 | 27.2 | 27.0 | 26.3 | 27.9 | 29.4 | 28.0 | 26.0 | 27.5 | 26.3 | 27.3 | 322.6 | 12 | |
| | (at 0700 LST) | days | 26.5 | 22.3 | 26.3 | 25.4 | 25.3 | 25.1 | 26.7 | 22.6 | 22.7 | 22.4 | 25.1 | 26.4 | 296.8 | 12 | |
| | (at 1300 LST) | days | 27.1 | 24.3 | 28.1 | 28.3 | 28.7 | 29.1 | 30.2 | 29.6 | 28 | | | | | | |

H. CLIMATE (Continued)

CLIMATIC SUMMARY * (Continued)

FORT A. P. HILL, VIRGINIA LATITUDE 38°07'N LONGITUDE 77°15'W ELEVATION 61.6M (202FT)

| PARAMETER DESCRIPTION | | UNIT OF MEASURE | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC | ANNUAL | YEARS OF RECORD |
|--|---------------|-----------------|------|------|------|------|------|------|------|------|------|------|------|------|--------|-----------------|
| Mean Number Days Ceiling ≥ 762 m (2500 ft) and Visibility ≥ 4.8 km (3 mi) | (at 1900 LST) | days | 25.8 | 23.7 | 26.7 | 27.0 | 27.7 | 27.3 | 29.6 | 28.7 | 26.6 | 27.7 | 26.7 | 26.6 | 324.1 | 12 |
| | (at 0100 LST) | days | 24.7 | 22.5 | 25.7 | 25.5 | 25.3 | 26.6 | 28.6 | 26.7 | 24.8 | 25.6 | 25.1 | 26.0 | 307.1 | 12 |
| | (at 0700 LST) | days | 24.5 | 21.0 | 24.9 | 24.1 | 23.9 | 24.2 | 25.8 | 22.1 | 22.1 | 21.5 | 23.6 | 25.1 | 282.8 | 12 |
| | (at 1300 LST) | days | 25.6 | 23.5 | 26.3 | 26.8 | 27.2 | 27.4 | 28.8 | 27.1 | 26.3 | 26.0 | 25.4 | 26.0 | 316.4 | 12 |
| Mean Number Days Ceiling ≥ 1828.8 m (6000 ft) and Visibility ≥ 4.8 km (3 mi) | (at 1900 LST) | days | 23.1 | 21.2 | 22.7 | 23.5 | 24.9 | 25.0 | 26.4 | 26.1 | 24.2 | 23.8 | 23.5 | 24.1 | 288.5 | 12 |
| | (at 0100 LST) | days | 21.2 | 19.2 | 22.7 | 22.8 | 22.3 | 24.4 | 27.5 | 24.9 | 23.0 | 22.7 | 22.6 | 23.2 | 276.5 | 12 |
| | (at 0700 LST) | days | 21.0 | 18.6 | 21.7 | 21.6 | 21.5 | 22.6 | 24.5 | 21.3 | 20.1 | 19.0 | 20.5 | 22.4 | 254.8 | 12 |
| | (at 1300 LST) | days | 22.0 | 20.2 | 20.8 | 20.3 | 20.1 | 20.3 | 21.0 | 19.7 | 20.0 | 21.7 | 21.2 | 23.5 | 250.8 | 12 |
| Mean Number Days Ceiling ≥ 3048 m (10,000 ft) and Visibility ≥ 4.8 km (3 mi) | (at 1900 LST) | days | 20.4 | 19.1 | 20.0 | 21.2 | 23.7 | 23.7 | 25.1 | 24.1 | 22.9 | 21.4 | 21.6 | 21.5 | 264.7 | 12 |
| | (at 0100 LST) | days | 20.2 | 17.2 | 20.5 | 20.1 | 20.6 | 22.7 | 26.0 | 23.5 | 21.5 | 21.1 | 21.2 | 22.5 | 257.1 | 12 |
| | (at 0700 LST) | days | 19.0 | 16.4 | 19.5 | 19.5 | 19.8 | 21.5 | 23.6 | 19.8 | 19.1 | 17.2 | 19.0 | 21.0 | 235.4 | 12 |
| | (at 1300 LST) | days | 20.5 | 18.2 | 18.6 | 18.2 | 18.2 | 19.1 | 19.6 | 18.7 | 18.8 | 21.1 | 19.6 | 21.1 | 231.8 | 12 |

LST - Local Standard Time

* Temperature and precipitation data recorded at Fredericksburg National Park [Elevation 30.5 m (100 ft), Latitude 38° 18' N, Longitude 77° 28' W] , 16 km (10 mi) northwest of Fort A. P. Hill.

Other data recorded at Richard Evelyn Byrd International Airport, Richmond [Elevation 50.9 m (167 ft), Latitude 37° 30' N, Longitude 77° 19' W] , 42 km (26 mi) south of Fort A. P. Hill.

EPHEMERIS FOR FORT A. P. HILL, VIRGINIA (EASTERN STANDARD TIME)

| NAUTICAL TWILIGHT | | | | | NAUTICAL TWILIGHT | | | | | NAUTICAL TWILIGHT | | | | | NAUTICAL TWILIGHT | | | | |
|-------------------|--------|------|---------|--------|-------------------|--------|------|---------|--------|-------------------|--------|------|---------|--------|-------------------|--------|------|---------|--------|
| DATE | BEGIN- | END | SUNRISE | SUNSET | DATE | BEGIN- | END | SUNRISE | SUNSET | DATE | BEGIN- | END | SUNRISE | SUNSET | DATE | BEGIN- | END | SUNRISE | SUNSET |
| January 1 | 0623 | 1803 | 0726 | 1700 | April 1 | 0457 | 1930 | 0555 | 1832 | July 1 | 0339 | 2047 | 0450 | 1936 | October 1 | 0508 | 1850 | 0605 | 1753 |
| January 11 | 0624 | 1811 | 0725 | 1709 | April 11 | 0441 | 1940 | 0540 | 1841 | July 11 | 0346 | 2043 | 0455 | 1934 | October 11 | 0517 | 1835 | 0614 | 1738 |
| January 21 | 0621 | 1820 | 0722 | 1720 | April 21 | 0425 | 1951 | 0526 | 1851 | July 21 | 0355 | 2035 | 0503 | 1928 | October 21 | 0526 | 1821 | 0623 | 1724 |
| February 1 | 0615 | 1831 | 0714 | 1732 | May 1 | 0411 | 2003 | 0513 | 1900 | August 1 | 0406 | 2024 | 0512 | 1919 | November 1 | 0536 | 1809 | 0635 | 1711 |
| February 11 | 0606 | 1841 | 0704 | 1743 | May 11 | 0358 | 2014 | 0503 | 1909 | August 11 | 0417 | 2011 | 0520 | 1908 | November 11 | 0546 | 1800 | 0645 | 1701 |
| February 21 | 0555 | 1851 | 0652 | 1754 | May 21 | 0347 | 2025 | 0454 | 1918 | August 21 | 0428 | 1956 | 0529 | 1855 | November 21 | 0556 | 1754 | 0656 | 1654 |
| March 1 | 0545 | 1859 | 0642 | 1802 | June 1 | 0339 | 2035 | 0448 | 1926 | September 1 | 0439 | 1938 | 0539 | 1839 | December 1 | 0605 | 1752 | 0706 | 1650 |
| March 11 | 0530 | 1909 | 0627 | 1812 | June 11 | 0335 | 2043 | 0446 | 1932 | September 11 | 0449 | 1922 | 0547 | 1824 | December 11 | 0613 | 1752 | 0715 | 1650 |
| March 21 | 0515 | 1919 | 0612 | 1822 | June 21 | 0335 | 2046 | 0446 | 1935 | September 21 | 0459 | 1905 | 0556 | 1808 | December 21 | 0554 | 1756 | 0722 | 1653 |

I. CROSS-COUNTRY MOVEMENT

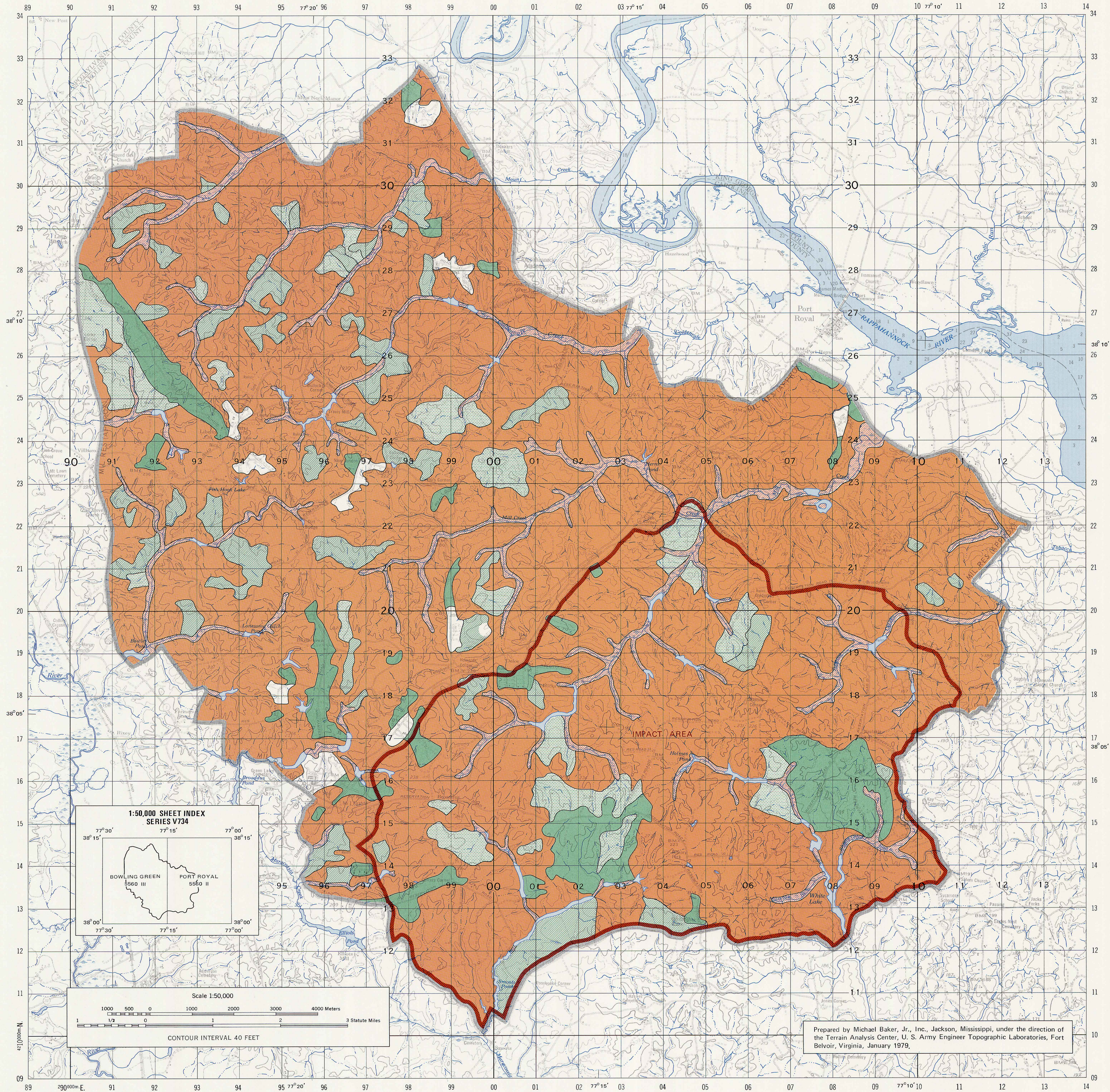
| MAP UNIT | GENERAL TERRAIN CONDITIONS | MOVEMENT OF TRACKED VEHICLES ¹ | MOVEMENT OF WHEELED VEHICLES ² | MOVEMENT OF FOOT TROOPS |
|----------|--|--|---|---|
| 1 | Level to gently sloping open areas mostly covered with short grasses and low shrubs. Slopes mainly less than 8 percent; locally, up to 15 percent on side slopes of a few gullies and drainageways. These steeper side slopes occur in the upper portions of drainage basins. Soils typically loamy fine sands with good bearing strength most of year. ³ | Easy in any direction for both tank and armored personnel carrier (APC). Local obstructions easily by-passed. Dust a problem during periods of dry weather. ⁴ | Unrestricted when soils dry and firm. Slowed by locally steep slopes near drains. Movement may be infeasible for short periods during and after soaking rains or winter and spring thaws. | Unrestricted except slightly slowed during long wet periods when soils may be unusually soft. |
| 2 | Level to gently rolling areas predominantly covered with brush, scrub, or immature tree growth. Slopes predominantly less than 8 percent. Trees chiefly mixed hardwoods and softwoods. Includes a number of small tracts or fields of planted pine, scattered, older stands of large trees, and a few grass-covered openings. Some pine plantations crossed by cleared swaths, created for purpose of thinning; swaths 2.4 to 4.6 m (8 to 15 ft) wide. Tangled patches of undergrowth composed of briars and wood shrubs common in some areas. Soils chiefly loamy fine sands, usually well-drained, grading to silty or clayey loams near shallow drainageways. | Slightly slowed by woody vegetation mainly due to impaired visibility and necessity to avoid older, large trees. Movement easy in open areas and along cleared swaths. Vegetation undergrowth no hindrance except some impairment of visibility. | Moderately slowed by woody vegetation. Movement fairly easy in open areas and along cleared swaths through pine plantations. Impaired visibility, particularly when vegetation in full foliage, a contributor to reduced movement conditions. | Fairly easy but slowed where patches of briars and thick, tangled vegetation encountered. |
| 3 | Gently rolling, moderately forested areas, dissected by gullies and small streams. Most slopes less than 8 percent but those near gullies and streams range between 15 and 30 percent. Vegetation consists of mixed hardwoods and softwoods. Trees randomly spaced; spacing ranges from 4.6 to 13.7 m (15 to 45 ft). Stem diameters generally more than 15 cm (6 in). Undergrowth varies from sparse to dense depending on density of overstory. Soils composed of loamy fine sands, usually well-drained, grading to silty or clayey loams near streams. | Moderately slowed by randomly spaced large trees. APC less affected by vegetation compared to tank. Combination of steep slopes and closely spaced trees near gullies and streams may cause movement to be difficult in some places. | Severely slowed by randomly spaced trees. Wooded, steep slopes may require long detours. Visibility reduced in areas of dense undergrowth. Hidden stumps and fallen logs present moderately high risk of damage to moving vehicles. | Generally easy in any direction. Slowed in areas of dense undergrowth and where slopes approach their maximum. |
| 4 | Nearly level to gently rolling areas covered with medium to dense forest. Very similar to area described in Map Unit 3 except more densely wooded. Tree spacing ranges from 2.4 to 9.1 m (8 to 30 ft); stem diameters commonly more than 15 cm (6 in). This unit makes up the largest portion of the reservation area. | Severely slowed by randomly spaced trees. Maintaining constancy of movement both in direction and speed, very difficult. Sharp turns, stops, starts, and occasional reverses, generally required. As in Map Unit 3, APC less affected by obstacles than tank. Tank, however, has capability to push over all but the larger trees. | Impractical due to closely spaced trees and steep slopes on side slopes of gullies and other drainageways. Movement limited to firebreaks and existing trails. | Moderately slowed in dense wooded areas. Alternate routes required where briars and thick tangled undergrowth occur. Additionally slowed when soils soft or slippery, especially on the steeper slopes near drainageways. |
| 5 | Poorly drained, wooded, bottomlands and drainageways containing numerous ponds and swamps. Slopes less than 3 percent. Vegetation consists of water-tolerant trees and shrubs such as willow, birch, water oak, and alder. Tree spacing extremely varied, generally from 4.6 to 15.2 m (15 to 50 ft); stem diameters range from 10 to 61 cm (4 to 24 in). Soils commonly loamy sands and clay or sandy loam, poorly drained; soft and miry much of the year. Ponds are both natural (numerous beaver ponds) and man-made. Stream fords non-existent. | Generally impractical for tanks due to the necessity of avoiding trees too large to push over, combined with soft, miry soil conditions prevalent in many localized areas. Effective movement usually limited to existing trails. APC movement feasible but slow and tortuous in most places. | Precluded by woody vegetation, ponds, marshes, and wet, soft soils. Movement possible only on existing trails. | Slow and tortuous. Severe impairment to movement due to ponds, soft ground, and thick vegetation. |

1 Comments apply to the M-60 tank and the M-113 armored personnel carrier (APC).

2 Comments apply to the M-35, 2½-ton truck and the M-151, ¼-ton truck.

3 Movement conditions on the reservation will be degraded for a day or two following heavy rains. Well-drained, chiefly sandy soils occur on the uplands and usually remain wet only for short durations. Poorly drained, mostly clayey soils of the forested bottomlands, however, are wet and soft for long periods of time and are untrafficable throughout much of the year. Precipitation is well distributed through the year, with the maximum in August and the minimum in February. Periods of thawing weather in winter and early spring, creating soft soil conditions, will likewise, have a slowing effect on vehicular movement. Snowfall at Fort A. P. Hill is seldom a limiting factor in cross-country movement.

4 Dust can be a severe nuisance or problem on all of the reservation during periods of prolonged dry weather, especially in those areas where heavy use has destroyed the vegetative ground cover and loosened the surface soil.



FORT A.P. HILL, VIRGINIA TERRAIN ANALYSIS

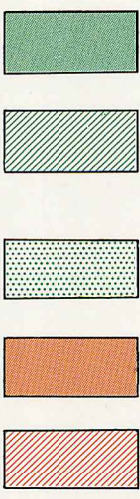
CROSS-COUNTRY MOVEMENT

This map deals with cross-country movement, or movement away from roads, and is primarily intended for use in planning operations. For determining exact driving routes, reconnaissance on the ground is required. Data on the terrain factors and the evaluations are generalized to suit the scale of the map. Many areas of minor areal extent, such as small tracts of forest, cleared areas, and depressions, are too small to portray.

The predicted movement ratings are those believed to prevail in most years. Variations in these evaluations may occur from year to year and even within a season due to abnormal variations in the weather.

Movement conditions will be degraded for a day or two following heavy rains. Well-drained, chiefly sandy soils occur on the uplands and usually remain wet only for short durations. Poorly drained, mostly clayey soils of the bottomlands, however, are wet and soft for long periods of time and are untrafficable throughout much of the year. Precipitation is well distributed through the year, with the maximum in August and the minimum in February. Periods of thawing weather in winter and early spring, creating soft soil conditions, will likewise, have a slowing effect on vehicular movement. Snowfall at Fort A. P. Hill is seldom a limiting factor in cross-country movement.

The evaluations are based on terrain conditions as they are known at present. Future alterations of the terrain, such as timber clearing operations, artificial drainage, and road construction, would obviously change cross-country movement conditions. See Non-Urban Culture Features for manmade features which may affect movement. Areas with no color represent "built-up areas" and are not evaluated.



1. Level to gently sloping areas with short grasses and low shrubs.
2. Level to gently rolling areas predominantly covered with brush, scrub, or immature tree growth.
3. Gently rolling, moderately forested areas, dissected by gullies and streams.
4. Nearly level to gently rolling areas covered with medium to dense forest.
5. Poorly drained, wooded, bottomlands and drainageways containing numerous ponds and swamps.

NOTE: Number refers to entry in table.



Impact area; off-limits to vehicles and foot troops due to the danger of unexploded munitions.

EVALUATION OF TERRAIN FOR CROSS-COUNTRY MOVEMENT

| TANK (M-60) | PREDICTED MOVEMENT RATINGS FOR: | | | | FOOT TROOPS |
|-------------|---------------------------------|---------------------|---------------------|------|-------------|
| | APC (M-113) | 2½-TON TRUCK (M-35) | ½-TON TRUCK (M-151) | | |
| Good | Good | Good | Good | Good | Good |
| Good | Good | Fair | Fair | Good | Fair |
| Fair | Good | Poor | Poor | Good | Poor |
| Poor | Poor | Unsuited | Unsuited | Fair | Unsuited |
| Unsuited | Unsuited | Unsuited | Unsuited | Poor | Unsuited |

EXPLANATION OF RATING TERMS

- Good** Conditions permit free movement in any direction. Terrain will permit 12 or more passes in trace of an M-60 tank or permit at least one maneuver (starts, stops, sharp turns, or crossing of tracks) at one location.
- Fair** Conditions moderately hinder progress or moderately restrict choices of direction for movement. Terrain will permit 3 to 12 passes in trace of an M-60 but maneuvering will be difficult.
- Poor** Conditions severely hinder progress or greatly restrict choice of movement routes. Terrain will probably permit up to 3 passes in trace of an M-60. Very cautious driving required. Movement in trace should be avoided.
- Unsuited** Conditions preclude all but local movement. Engineer work required for vehicular movement.

J. LINES OF COMMUNICATION

Lines of Communication (LOC) at Fort A. P. Hill are depicted on the accompanying map. Supportive information for LOC as shown on the graphic is provided in the tables following this summary. **ROADS:** Primary access to Fort A. P. Hill is provided by U. S. Route 301 (4 lane divided asphaltic concrete highway), U. S. Route 17 (2 lane asphaltic concrete highway), and Virginia State Route 2 (2 lane asphaltic concrete highway). Secondary access is provided by State Routes 619, 625, and 610 (2 lane bituminous pavement). Approximately 87 kilometers (54 miles) of hard surface primary roads exist on the reservation providing all-weather 2 lane travel for conventional vehicles. The secondary road system consists of approximately 158 kilometers (98 miles) of fair weather roads excluding campsite roads. Surfaces consist of sand, clay, or gravel or a combination of the materials and widths vary from 3.7 meters (12 feet) to 6.1 meters (20 feet). There are approximately 85 kilometers (53 miles) of tertiary (light duty) roads. The tertiary roads vary in surface and width. Surface materials are bituminous, sand, clay, gravel, or dirt. Widths vary from 2.4 to 3.0 meters (8 to 10 feet) for unimproved trails and from 3.0 to 6.1 meters (10 to 20 feet) for surfaced light duty roads. The secondary and tertiary roads provide access to training, range and impact areas. Roads were constructed to minimize cuts and fills and conform to the land contour; therefore shoulders are generally absent or undefined. Wide cleared areas occur along some roads and these cleared areas are utilized as tank trails. Approximately 80 kilometers (50 miles) of designated tank trails of similar characteristics exist on the reservation. The trails are maintained on a regular basis and culverts exist in stream crossings. No fords exist due to unstable material in stream beds. **ROAD BRIDGES:** There are 11 bridges on Fort A. P. Hill with varying Military Load Classifications. All bridges are timber trestle type with the exception of one steel truss type on Route 620 over Beverly

Run. All decks are wood and seven bridges have steel stringers. The U. S. Army Corps. of Engineers, Norfolk District, Virginia conducted an evaluation of the bridges in March, 1977. There are two underpasses to provide access under U. S. Route 301. The underpasses are located on Routes 623 and 618; the underpass on Route 623 near Howard's Corner is a designated tank crossing, providing access to the supply and maintenance area. **RAILROADS:** Fort A. P. Hill does not have direct rail access. The Richmond, Fredericksburg, and Potomac Railroad runs parallel and approximately 3.2 kilometers (2 miles) west of the western boundary of the reservation. **HELICOPTER LANDING ZONES:** Fort A. P. Hill has 10 designated helicopter landing zones. Four landing zones utilize inactive grass airstrips and six have been constructed specifically for helicopters. JP-4 fuel is available from refueler trucks. Facilities at the AAF No. 1 landing zone consist of an operations building with the second story serving as a control tower. The control tower is operational for rotary-wing aircraft during the annual training period (April through September). **DROP ZONE:** The drop zone, in the northwest portion of the reservation, is located on gently rolling terrain covering approximately 1.3 square kilometers (0.5 square miles) and surrounded by slightly steeper tree covered hills and gullies. A buffer zone has been cleared on all sides of the designated drop zone area to accommodate bundle drops. The drop zone is oriented northwest-southeast; it is 2400 meters (7873.9 feet) long and 600 meters (1968.5 feet) wide. The highest elevation within the drop zone is 70.1 meters (230 feet). Aircraft approach the drop zone on a heading of 336° (true). Point of impact is at grid reference 918263 and elevation is 70.1 meters (230 feet). The drop zone is accessible from hard surface road (Route 608),Gracik Trail (designated tank trail) and several unimproved dirt roads.

1. ROADS

| ROUTE NUMBER/NAME | GRID REFERENCE | | LENGTH OF SEGMENT | MILITARY LOAD CLASSIFICATION ¹ | ROUTE TYPE | SURFACE | | REMARKS |
|--------------------------|----------------|--------|-------------------------|---|--------------|---------------------------|--------------------------------------|---|
| | FROM | TO | | | | CONSTRUCTION MATERIALS | WIDTH/CONDITION | |
| Ackerman Trail | 903280 | 926298 | 3.2 km (2.0 mi) | No Data | Fair Weather | Dirt | 4.3 m (14 ft)/poor | |
| Ashcake Lane (Route 620) | | | | | | | | |
| Segment a | 095238 | 087206 | 3.5 km (2.2 mi) | 16 | Fair Weather | Gravel | 4.9 to 5.5 m (16 to 18 ft)/fair | |
| Segment b | 087206 | 046142 | 9.7 km (6.0 mi) | 16 | Fair Weather | Sand and gravel | 3.7 to 4.9 m (12 to 16 ft)/fair | |
| Battery Lane | 977131 | 988116 | 2.1 km (1.3 mi) | No Data | Fair Weather | Sand, clay, and gravel | 3.7 to 4.3 m (12 to 14 ft)/fair | |
| Blue Gill Road | 971182 | 978190 | 1.1 km (0.7 mi) | No Data | All Weather | Bituminous | 6.1 m (20 ft)/good | |
| Broomstraw Trail | 075149 | 080136 | 1.6 km (1.0 mi) | No Data | Fair Weather | Dirt | 3.7 m (12 ft)/poor | |
| Bullock Road | 943246 | 955249 | 1.3 km (0.8 mi) | No Data | Fair Weather | Gravel | 4.3 m (14 ft)/fair | |
| Burma Road | | | | | | | | |
| Segment a (Route 610) | 916305 | 952309 | 4.8 km (3.0 mi) | No Data | All Weather | Bituminous | 5.5 m (18 ft)/excellent | |
| Segment b | 969312 | 979309 | 1.0 km (0.6 mi) | No Data | Fair Weather | Dirt | 3.7 m (12 ft)/poor | |
| Segment c | 979309 | 986283 | 4.5 km (2.8 mi) | 30 | Fair Weather | Gravel | 7.3 m (24 ft)/good | |
| Buzzard Road | 949191 | 953183 | 0.8 km (0.5 mi) | No Data | Fair Weather | Gravel | 6.1 m (20 ft)/fair | |
| Campbell Road | 959182 | 971182 | 1.4 km (0.9 mi) | No Data | All Weather | Bituminous | 6.1 m (20 ft)/good | |
| Cedar Trail | | | | | | | | |
| Segment a | 000240 | 997244 | 0.3 km (0.2 mi) | No Data | Fair Weather | Sand and gravel | 4.3 m (14 ft)/fair | |
| Segment b | 997244 | 989249 | 1.1 km (0.7 mi) | No Data | Fair Weather | Dirt | 3.0 to 3.7 m (10 to 12 ft)/poor | |
| Charity Lane | 031126 | 045139 | 2.1 km (1.3 mi) | No Data | Fair Weather | Dirt | 2.4 to 3.0 m (8 to 10 ft)/poor | Unimproved |
| Corbett Trail | 039245 | 036236 | 0.8 km (0.5 mi) | No Data | Fair Weather | Dirt | 3.7 to 4.3 m (12 to 14 ft)/poor | |
| Custer Trail | 051237 | 086247 | 4.5 km (2.8 mi) | No Data | All Weather | Bituminous | 6.1 m (20 ft)/good | |
| Dew Road | 978323 | 988321 | 1.6 km (1.0 mi) | No Data | All Weather | Bituminous | 5.5 m (18 ft)/fair | |
| Engineer Road | 956257 | 975234 | 3.1 km (1.9 mi) | No Data | All Weather | Bituminous | 6.1 m (20 ft)/good | Merges with Route 617 for 1.4 km (0.9 mi) |
| Fortune Road | 961192 | 991188 | 3.4 km (2.1 mi) | No Data | All Weather | Bituminous | 6.1 to 6.4 m (20 to 21 ft)/good | |
| General Forest Road | 992265 | 004246 | 2.6 km (1.6 mi) | No Data | Fair Weather | Gravel | 6.1 m (20 ft)/good | |
| Gordon Trail | 948233 | 944228 | 0.6 km (0.4 mi) | No Data | Fair Weather | Dirt | 3.7 m (12 ft)/poor | |
| Gracik Trail | 920259 | 946261 | 2.9 km (1.8 mi) | No Data | Fair Weather | Sand, clay, and gravel | 3.7 to 4.9 m (12 to 16 ft)/poor | |
| Jackson Camp Site Road | | | | | | | | |
| Segment a | 944250 | 936251 | 2.9 km (1.8 mi) | No Data | Fair Weather | Sand, clay, and gravel | 4.9 to 5.5 m (16 to 18 ft)/poor | |
| Segment b | 936251 | 941245 | 1.0 km (0.6 mi) | No Data | All Weather | Bituminous | 5.8 m (19 ft)/fair | |
| Lent Road | 032246 | 033222 | 2.7 km (1.7 mi) | 4 | Fair Weather | Sand and gravel | 4.3 m (14 ft)/fair | |
| Lumkin Road | 074227 | 080206 | 2.7 km (1.7 mi) | 50 W ² 35 T | Fair Weather | Gravel | 5.8 m (19 ft)/good | |
| Lyon Road | 978278 | 985261 | 1.9 km (1.2 mi) | No Data | Fair Weather | Gravel | 4.9 m (16 ft)/good | |
| Mansion Trail | 998281 | 998271 | 1.0 km (0.6 mi) | No Data | Fair Weather | Dirt | 3.7 m (12 ft)/poor | |
| Moon Mountain Road | 992296 | 001300 | 1.3 km (0.8 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor | |
| North Range Road | | | | | | | | |
| Segment a | 971161 | 047226 | 9.7 km (6.0 mi) | 30 | All Weather | Bituminous | (20 to 26 ft)/good | |
| Segment b | 047226 | 066204 | 3.2 km (2.0 mi) | 60 W 45 T 60 | All Weather | Bituminous | 6.1 m (20 ft)/good | Merges with Route 618 |
| Segment c | 066204 | 109176 | 6.6 km (4.1 mi) | 60 | All Weather | Bituminous | 6.1 m (20 ft)/good | Merges with Route 619 |
| Overland Trail | 944306 | 945297 | 1.0 km (0.6 mi) | No Data | Fair Weather | Dirt | 3.7 m (12 ft)/poor | |
| Patton Road | 993280 | 996270 | 1.3 km (0.8 mi) | No Data | Fair Weather | Gravel | 5.5 m (18 ft)/good | |
| Perrin Road | 999234 | 013205 | 4.3 km (2.7 mi) | 16 | Fair Weather | Gravel | 4.3 to 4.9 m (14 to 16 ft)/good | |
| Peuman Road | 991189 | 044241 | 8.0 km (5.0 mi) | No Data | Fair Weather | Gravel | 6.1 m (20 ft)/good | |
| Pigtail Trail | 072218 | 068205 | 1.4 km (0.9 mi) | 6 | Fair Weather | Dirt | 3.0 m (10 ft)/poor | Unimproved |
| Powers Road | 915270 | 930286 | 2.6 km (1.6 mi) | No Data | Fair Weather | Gravel | 5.5 m (18 ft)/fair | |
| Sawdust Trail | | | | | | | | |
| Segment a | 974238 | 980242 | 0.6 km (0.4 mi) | No Data | Fair Weather | Sand and gravel | 4.6 to 6.1 m (15 to 20 ft)/fair | |
| Segment b | 980242 | 989249 | 1.3 km (0.8 mi) | No Data | Fair Weather | Sand and clay | 4.6 to 6.1 m (15 to 20 ft)/fair | |
| Segment c | 989249 | 984260 | 1.3 km (0.8 mi) | No Data | Fair Weather | Dirt | 3.0 to 3.7 m (10 to 12 ft)/poor | Unimproved |
| Shackleford Road | 956216 | 989217 | 3.9 km (2.4 mi) | No Data | Fair Weather | Gravel | 5.5 m (18 ft)/good | |
| Snell Road | 938190 | 961192 | 2.4 km (1.5 mi) | No Data | Fair Weather | Gravel | 4.9 to 5.5 m (16 to 18 ft)/good | |
| South Range Road | | | | | | | | |
| Segment a | 971161 | 974131 | 3.9 km (2.4 mi) | No Data | All Weather | Bituminous | 6.7 to 7.3 m (22 to 24 ft)/good | Merges with Route 637 |
| Segment b | 006113 | 049126 | 4.8 km (3.0 mi) | No Data | Fair Weather | Sand, clay, and gravel | 4.6 m (15 ft)/fair | |
| Segment c | 049126 | 081126 | 4.5 km (2.8 mi) | No Data | Fair Weather | Gravel | 3.7 to 4.3 m (12 to 14 ft)/fair | |
| Spring Road | 957246 | 954255 | 1.1 km (0.7 mi) | No Data | Fair Weather | Gravel | 3.7 m (12 ft)/good | |
| Taliaferro Trail | | | | | | | | |
| Segment a | 083245 | 083240 | 0.5 km (0.3 mi) | No Data | Fair Weather | Bituminous | 5.2 m (17 ft)/good | |
| Segment b | 083241 | 077227 | 1.4 km (0.9 mi) | No Data | Fair Weather | Gravel | 5.5 m (18 ft)/good | |
| Tater Trail | 957223 | 960217 | 0.6 km (0.4 mi) | No Data | Fair Weather | Sand and clay | 3.7 m (12 ft)/fair | |
| Thomas Road | 939243 | 967228 | 3.5 km (2.2 mi) | No Data | Fair Weather | Gravel | 5.5 m (18 ft)/good | |
| Thornton Trail | 910195 | 929202 | 2.4 km (1.5 mi) | 60 W 50 T | Fair Weather | Gravel | 3.7 to 4.3 m (12 to 14 ft)/fair | |
| Travis Lake Road | 941245 | 968235 | 3.4 km (2.1 mi) | No Data | All Weather | Bituminous | 4.9 m (16 ft)/good | |
| Windsor Road | | | | | | | | |
| Segment a | 969302 | 981314 | 2.3 km (1.4 mi) | No Data | Fair Weather | Gravel | 6.4 to 6.7 m (21 to 22 ft)/good | |
| Segment b | 981314 | 982317 | 0.3 km (0.2 mi) | No Data | All Weather | Bituminous | 6.7 m (22 ft)/good | |
| Woodford Road | | | | | | | | |
| Segment a | 933285 | 944285 | 1.3 km (0.8 mi) | No Data | Fair Weather | Sand, and clay | 4.3 m (14 ft)/good | |
| Segment b | 944285 | 953276 | 1.4 km (0.9 mi) | No Data | Fair Weather | Gravel | 4.9 m (16 ft)/good | |
| Segment c | 953276 | 957260 | 1.8 km (1.1 mi) | No Data | Fair Weather | Sand and gravel | 4.9 m (16 ft)/good | |
| U. S. Route 301 | 956157 | 060249 | 16.7 km (10.4 mi) | No Data | All Weather | Asphaltic concrete | 2 @ 7.3 m (2 @ 24 ft)/excellent | 4 lane divided highway |
| Route 360 | 928232 | 935174 | 7.6 km (4.7 mi) | No Data | Fair Weather | Gravel | 5.5 m (18 ft)/good | |
| Route 361 | 936189 | 956216 | 3.9 km (2.4 mi) | No Data | Fair Weather | Gravel | 5.5 m (18 ft)/good | |
| Route 607 | | | | | | | | |
| Segment a | 907237 | 948256 | 5.8 km (3.6 mi) | No Data | All Weather | Bituminous | 6.1 (20 ft)/good | |
| Segment b | 948257 | 960306 | 5.8 km (3.6 mi) | No Data | Fair Weather | Gravel | 6.1 to 6.4 m (20 to 21 ft)/good | |
| Segment c | 960306 | 983328 | 3.4 km (2.1 mi) | No Data | Fair Weather | Gravel | 3.7 to 4.3 m (12 to 14 ft)/good | |
| Route 608 | | | | | | | | |
| Segment a | 901281 | 971161 | 16.3 km (10.1 mi) | No Data | All Weather | Bituminous | 6.1 to 6.7 m (20 to 22 ft)/excellent | |
| Segment b | 973155 | 047136 | 12.7 km (7.9 mi) | No Data | Fair Weather | Sand, clay, and gravel | 4.9 to 5.5 m (16 to 18 ft)/fair | |
| Segment c | 047136 | 049124 | 1.1 km (0.7 mi) | No Data | Fair Weather | Gravel | 3.7 to 4.3 m (12 to 14 ft)/good | |
| Route 612 | 919306 | 981284 | 8.7 km (5.4 mi) | No Data | Fair Weather | Gravel | 5.2 to 6.1 m (17 to 20 ft)/good | Merges with Route 607 |
| Route 614 | 948256 | 005282 | 8.0 km (5.0 mi) | No Data | All Weather | Bituminous | 6.1 m (20 ft)/good | |
| Route 615 | 994307 | 995308 | 0.3 km (0.2 mi) | No Data | All Weather | Bituminous | 4.3 m (14 ft)/good | |
| Route 616 | | | | | | | | |
| Segment a | 975234 | 016253 | 5.8 km (3.6 mi) | No Data | All Weather | Bituminous | 5.5 to 6.1 m (18 to 20 ft)/good | |
| Segment b | 016253 | 021271 | 1.9 km (1.2 mi) | No Data | Fair Weather | Gravel | 5.5 (18 ft)/good | |

J. LINES OF COMMUNICATION (Continued)

1. ROADS (Continued)

| ROUTE NUMBER/NAME | GRID REFERENCE FROM TO | LENGTH OF SEGMENT | MILITARY LOAD CLASSIFICATION ¹ | ROUTE TYPE | SURFACE | | REMARKS |
|-----------------------------|---------------------------|-------------------------|---|--------------|---------------------------|------------------------|---------------------------------|
| | | | | | CONSTRUCTION MATERIALS | WIDTH/CONDITION | |
| Route 617 | | | | | | | |
| Segment a | 955221 | 975234 | 2.7 km (1.7 mi) | No Data | All Weather | Bituminous | 6.1 m (20 ft)/good |
| Segment b (Jeb Stuart Road) | 969247 | 021271 | 6.6 km (4.1 mi) | No Data | Fair Weather | Gravel | 5.5 to 6.1 m (18 to 20 ft)/good |
| Route 618 | | | | | | | |
| Segment a | 016253 | 047226 | 5.3 km (3.3 mi) | 60 W 45 T | All Weather | Bituminous | 5.5 to 6.1 m (18 to 20 ft)/good |
| Segment b | 066204 | 086160 | 4.7 km (2.9 mi) | No Data | Fair Weather | Sand and gravel | 4.9 to 5.5 m (16 to 18 ft)/fair |
| Segment c | 086160 | 089145 | 1.4 km (0.9 mi) | No Data | Fair Weather | Dirt | 3.7 m (12 ft)/poor |
| Segment d | 089145 | 090131 | 1.8 km (1.1 mi) | No Data | Fair Weather | Sand and clay | 4.3 to 4.9 m (14 to 16 ft)/poor |
| Route 622 | | | | | | | |
| Segment a | 032152 | 063177 | 4.8 km (3.0 mi) | No Data | Fair Weather | Sand and gravel | 5.2 m (17 ft)/fair |
| Segment b | 986155 | 991136 | 1.9 km (1.2 mi) | No Data | Fair Weather | Sand and gravel | 4.3 m (14 ft)/fair |
| Route 623 | | | | | | | |
| Segment a | 989229 | 995185 | 6.1 km (3.8 mi) | No Data | All Weather | Bituminous | 6.1 m (20 ft)/good |
| Segment b | 007188 | 038167 | 4.8 km (3.0 mi) | No Data | Fair Weather | Sand and gravel | 5.2 m (17 ft)/fair |
| Route 625 | 087170 | 095165 | 1.0 km (0.6 mi) | No Data | Fair Weather | Sand and gravel | 4.9 m (16 ft)/fair |
| Route 631 | 936174 | 959182 | 3.2 km (2.0 mi) | No Data | All Weather | Bituminous | 6.1 m (20 ft)/good |
| Route 637 | 975131 | 006112 | 5.1 km (3.2 mi) | No Data | Fair Weather | Sand, clay and gravel | 4.3 to 4.6 m (14 to 15 ft)/good |
| Route 681 | 093205 | 119224 | 3.4 km (2.1 mi) | No Data | Fair Weather | Sand and gravel | 4.9 to 5.5 m (16 to 18 ft)/good |
| Unnamed Road | 914237 | 923254 | 2.2 km (1.4 mi) | No Data | Fair Weather | Sand and gravel | 5.5 m (18 ft)/fair |
| Unnamed Road | 086160 | 096157 | 1.3 km (0.8 mi) | No Data | Fair Weather | Sand and gravel | 5.2 m (17 ft)/fair |
| Unnamed Road | 067239 | 077227 | 1.8 km (1.1 mi) | No Data | Fair Weather | Gravel | 4.3 m (14 ft)/good |
| Unnamed Road | 926299 | 930305 | 0.8 km (0.5 mi) | No Data | Fair Weather | Dirt | 3.7 m (12 ft)/poor |
| Unnamed Road | 987291 | 983283 | 0.8 km (0.5 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 933265 | 934259 | 0.6 km (0.4 mi) | No Data | Fair Weather | Sand, clay, and gravel | 5.2 to 6.1 m (17 to 20 ft)/poor |
| Unnamed Road | 989227 | 988221 | 0.8 km (0.5 mi) | No Data | Fair Weather | Sand and gravel | 3.7 to 4.3 m (12 to 14 ft)/fair |
| Unnamed Road | 971182 | 979175 | 1.3 km (0.8 mi) | No Data | Fair Weather | Sand and gravel | 3.0 to 4.3 m (10 to 14 ft)/fair |
| Unnamed Road | 989200 | 998203 | 1.6 km (1.0 mi) | No Data | Fair Weather | Sand and gravel | 3.7 m (12 ft)/fair |
| Unnamed Road | 979131 | 980125 | 0.6 km (0.4 mi) | No Data | Fair Weather | Gravel | 4.9 m (16 ft)/good |
| Unnamed Road | 960171 | 965171 | 0.6 km (0.4 mi) | No Data | Fair Weather | Gravel | 4.9 m (16 ft)/good |
| Unnamed Road | 963154 | 973155 | 1.0 km (0.6 mi) | No Data | Fair Weather | Sand and gravel | 4.3 to 4.9 m (14 to 16 ft)/fair |
| Unnamed Road | 964153 | 967145 | 0.8 km (0.5 mi) | No Data | Fair Weather | Sand and gravel | 4.9 (16 ft)/fair |
| Unnamed Road | 985162 | 986156 | 0.6 km (0.4 mi) | No Data | Fair Weather | Sand and gravel | 3.7 to 4.3 m (12 to 14 ft)/fair |
| Unnamed Road | 981171 | 979169 | 2.1 km (1.3 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 001153 | 994135 | 2.1 km (1.3 mi) | No Data | Fair Weather | Dirt | 3.0 to 3.7 m (10 to 12 ft)/poor |
| Unnamed Road | 984114 | 003120 | 2.9 km (1.8 mi) | 20 | Fair Weather | Sand, clay, and gravel | 3.7 to 4.6 m (12 to 15 ft)/poor |
| Unnamed Road | 999132 | 997117 | 1.6 km (1.0 mi) | No Data | Fair Weather | Dirt | 3.0 to 3.7 m (10 to 12 ft)/poor |
| Unnamed Road | 992136 | 991116 | 1.9 km (1.2 mi) | No Data | Fair Weather | Sand and gravel | 5.5 m (18 ft)/fair |
| Unnamed Road | 063175 | 064161 | 1.4 km (0.9 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 054174 | 048165 | 1.0 km (0.6 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 048164 | 045145 | 2.1 km (1.3 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 058142 | 062156 | 1.4 km (0.9 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 055142 | 047136 | 1.8 km (1.1 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 061140 | 062123 | 1.9 km (1.2 mi) | No Data | Fair Weather | Dirt | 3.0 to 3.7 m (10 to 12 ft)/poor |
| Unnamed Road | 061128 | 078124 | 1.9 km (1.2 mi) | No Data | Fair Weather | Dirt | 2.4 m (8 ft)/poor |
| Unnamed Road | 066127 | 071124 | 0.8 km (0.5 mi) | No Data | Fair Weather | Dirt | 2.4 to 3.0 m (8 to 10 ft)/poor |
| Unnamed Road | 083130 | 101139 | 2.9 km (1.8 mi) | No Data | Fair Weather | Dirt | 3.7 m (12 ft)/poor |
| Unnamed Road | 089180 | 106188 | 2.1 km (1.3 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 088178 | 110179 | 2.6 km (1.6 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 066205 | 052190 | 2.1 km (1.3 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 063188 | 046203 | 3.2 km (2.0 mi) | No Data | Fair Weather | Dirt | 3.0 to 3.7 m (10 to 12 ft)/poor |
| Unnamed Road | 033242 | 040235 | 1.1 km (0.7 mi) | No Data | Fair Weather | Dirt | 3.0 m (10 ft)/poor |
| Unnamed Road | 937234 | 945236 | 0.6 km (0.4 mi) | No Data | Fair Weather | Gravel | 5.5 m (18 ft)/good |
| Unnamed Road | 001131 | 018151 | 3.1 km (1.9 mi) | No Data | Fair Weather | Sand and clay | 2.4 to 3.0 m (8 to 10 ft)/poor |

1 Military Load Classification is for one-way traffic.
Bridges are not considered adequate for two-way traffic.

2 W: Wheeled Vehicles
T: Tracked Vehicles

ROAD BRIDGES

| BRIDGE NUMBER | ROUTE DESIGNATION | GRID REFERENCE | FEATURE CROSSED | MILITARY LOAD CLASSIFICATION ¹ | DIMENSIONS | | CLEARANCE | | TYPE/CONSTRUCTION MATERIAL | CONDITION | REMARKS |
|------------------|----------------------|-------------------|----------------------|--|------------------|---------------|-----------|-----------------|---|-----------|--|
| | | | | | LENGTH | WIDTH | VERTICAL | HORIZONTAL | | | |
| 1 | Unnamed Road | 994116 | Branch of Smoots Run | 20 | 4.9 m (16 ft) | 4.0 m (13 ft) | Unlimited | 3.8 m (12.5 ft) | Timber trestle bridge/wood | Good | |
| 2 | Route 620 | 075148 | Beverly Run | 16 | 11.6 m (38 ft) | 3.4 m (11 ft) | Unlimited | 3.2 m (10.6 ft) | Single span steel truss bridge/ wood deck, steel truss | Good | |
| 3 | Route 619 | 098199 | Portabago Creek | 60 | 13.3 m (43.6 ft) | 7.3 m (24 ft) | Unlimited | 7.5 m (24.5 ft) | Timber trestle bridge/wood with steel stringers | Good | |
| 4 | Pigtail Trail | 071216 | Branch of Mill Creek | 6 | 6.7 m (22 ft) | 4.3 m (14 ft) | Unlimited | 3.8 m (12.5 ft) | Timber trestle bridge/wood | Good | |
| 5 | Thornton Trail | 918201 | Turkey Track Creek | 60 W ² 50 T | 15.8 m (52 ft) | 7.3 m (24 ft) | Unlimited | 7.5 m (24.5 ft) | Timber trestle bridge/wood with steel stringers | Good | |
| 6 | Burma Road | 993301 | Mount Creek | 30 | 15.4 m (50.6 ft) | 6.1 m (20 ft) | Unlimited | 6.1 m (20 ft) | Timber trestle bridge/wood with steel stringers | Fair | Needs minor repairs to superstructure. |
| 7 | Perrin Road | 011223 | Mill Creek | 16 | 11.7 m (38.3 ft) | 3.7 m (12 ft) | Unlimited | 3.0 m (10 ft) | Timber trestle bridge/wood | Good | |
| 8 | North Range Road | 043223 | Mill Creek | 30 | 12.3 m (40.2 ft) | 7.6 m (25 ft) | Unlimited | 7.3 m (24 ft) | Timber trestle bridge/wood with steel stringers | Good | |
| 9 | Route 618 | 051222 | Mill Creek | 60 W 45 T | 25.1 m (82.4 ft) | 7.3 m (24 ft) | Unlimited | 7.3 m (24 ft) | Timber trestle bridge/wood with steel stringers | Good | |
| 10 | Lumkin Road | 073227 | Mill Creek | 50 W 35 T | 13.1 m (43 ft) | 7.3 m (24 ft) | Unlimited | 7.3 m (24 ft) | Timber trestle bridge/wood with steel stringers | Good | |
| 11 | Lent Road | 030235 | Mill Creek | 4 | 16.2 m (53 ft) | 3.7 m (12 ft) | Unlimited | 3.7 m (12 ft) | Timber trestle bridge/wood with steel stringers | Good | |

1 Military Load Classification is for one-way traffic.
Bridges are not considered adequate for two-way traffic.

2 W: Wheeled vehicles
T: Tracked vehicles

J. LINES OF COMMUNICATION (Continued)

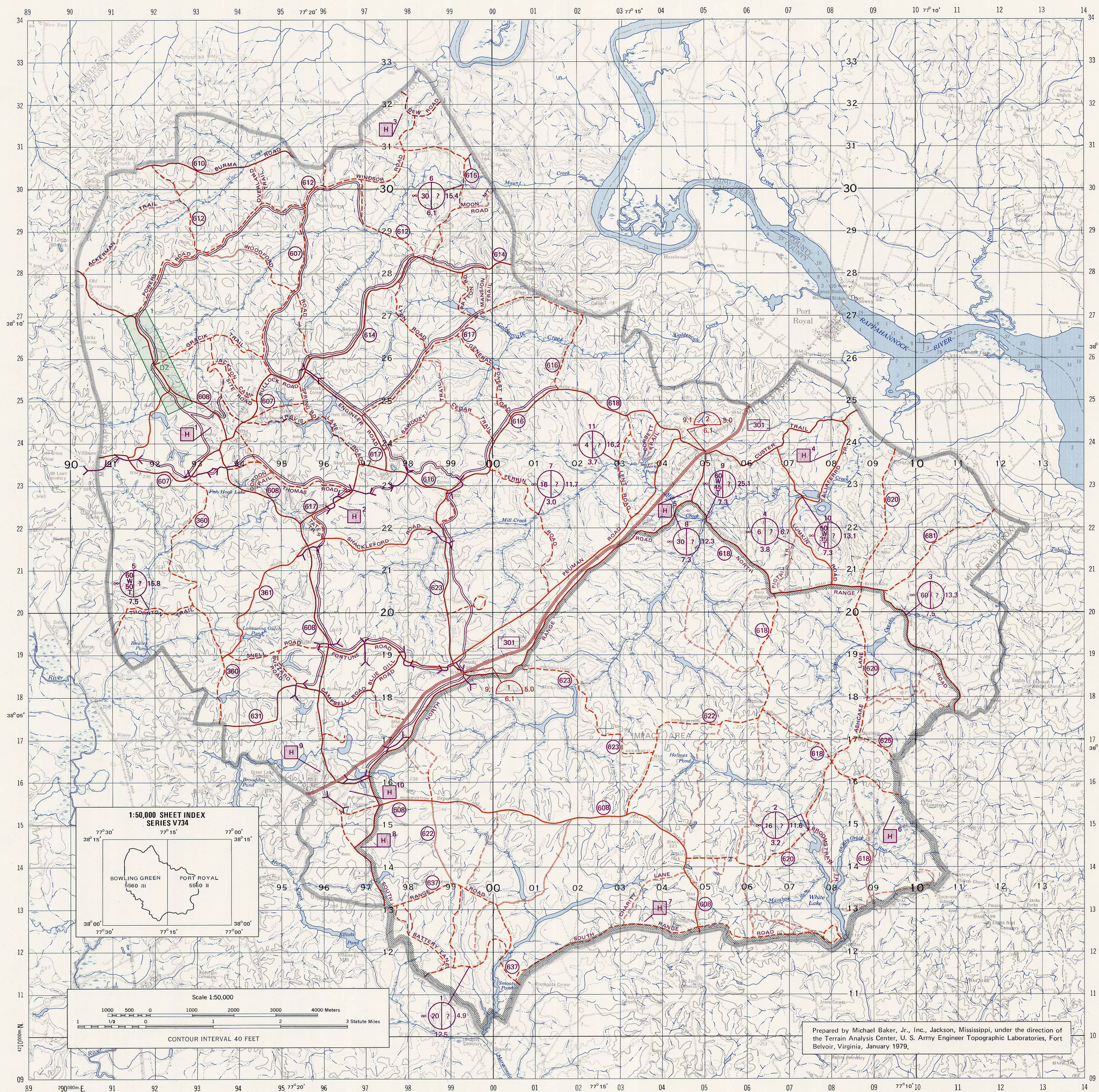
| TUNNELS | | | | | | | |
|------------|----------------|----------------------|---------------|-----------------------|-----------------------|--------------------------|--|
| MAP NUMBER | GRID REFERENCE | DIMENSIONS LENGTH | WIDTH | OVERHEAD CLEARANCE | APPROACH CONDITION | CONSTRUCTION MATERIAL | REMARKS |
| 1 | 993186 | 9.1 m (30 ft) | 6.1 m (20 ft) | 5.0 m (16.5 ft) | No Data | Reinforced concrete | Two underpasses 53.3 m (175 ft) apart; designated tank crossing. |
| 2 | 051238 | 9.1 m (30 ft) | 6.1 m (20 ft) | 5.0 m (16.5 ft) | No Data | Reinforced concrete | Two underpasses 53.3 m (175 ft) apart. |

2. HELICOPTER LANDING ZONES

| MAP NUMBER AND NAME | GRID REFERENCE | DIMENSIONS | AZIMUTH | ELEVATION | SURFACE MATERIAL | RESTRAINTS | REMARKS |
|--|-------------------|--|-----------------------------------|-----------------|---------------------|---|--|
| 1 Heth Headquarters Helipads (2 pads) | 933244 | 579.1 x 45.7 m (1900 x 150 ft) | 161° - 341° and 126° - 306° | 70.1 m (230 ft) | Concrete | Wires south and east. Tower southeast. Trees northeast. | Wind indicator. Utilizes inactive airstrip. |
| 2 Old Guard Helipad | 964225 | 13.4 m ² (144 ft ²) | 006° - 186° and 152° - 332° | 57.9 m (190 ft) | Grass | Water tower south. Trees north. | |
| 3 Pender Heliport (Moss Neck No. 3) | 979318 | 457.2 x 22.9 m (1500 x 75 ft) 579.1 x 22.9 m (1900 x 75 ft) | 104° - 284° and 126° - 306° | 22.9 m (75 ft) | Grass | Trees south and northwest. Wires north and east. | Wind indicator. Utilizes inactive airstrip. |
| 4 Cooke Heliport | 082238 | 640.1 x 30.5 m (2100 x 100 ft) | 024° - 204° | 22.9 m (75 ft) | Grass | Trees northwest. | Wind indicator. Utilizes inactive airstrip. |
| 5 Range 19 Helipad | 047229 | 21.3 x 21.3 m (70 x 70 ft) | 172° - 352° | 57.9 m (190 ft) | Grass | Trees north, west, and southwest. | |
| 6 Range 25 Helipads (4 pads) | 095154 | 743.3 m ² (8001 ft ²) Total 4 pads | 106° - 286° and 174° - 354° | 57.9 m (190 ft) | Concrete | One observation tower north. Two observation towers east. | |
| 7 Range 28 Helipad | 036127 | 371.2 m ² (3996 ft ²) | 087° - 267° | 67.1 m (220 ft) | Metal | Wires north, west, and south. Trees north and southwest. | |
| 8 Range 34 Helipad | 969145 | 13.4 m ² (144 ft ²) | 006° - 186° and 111° - 291° | 70.1 m (230 ft) | Grass | Trees east, west, and south. Wires west and south. | |
| 9 Headquarters Helipad | 959162 | 199.8 m ² (2151 ft ²) | 076° - 256° and 015° - 195° | 62.5 m (205 ft) | Grass | Buildings south and northeast. Wires, water tower, and flag pole west. | To be relocated. |
| 10 A. P. Hill AAF No. 1 | 966158 | 579.1 x 30.5 m (1900 x 100 ft) | 047° - 227° | 62.5 m (205 ft) | Grass | Wires and control tower north. Trees east and west. | Wind indicator. Utilizes inactive airstrip. |

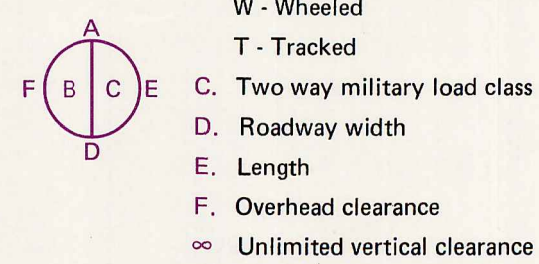
3. DROP ZONE

| MAP NUMBER | GRID REFERENCE | DIMENSIONS LENGTH | WIDTH | AZIMUTH | ELEVATION | SURFACE DESCRIPTION | AIRCRAFT OBSTRUCTIONS | REMARKS |
|------------|--|----------------------|-------------------|-------------|-----------------|---|-----------------------|---|
| 1 | NE 918272 SE 929249 SW 923247 NW 913269 | 2400 m (7874 ft) | 600 m (1968.5 ft) | 156° - 336° | 70.1 m (230 ft) | Grass covered sand and clay. Gently rolling terrain. | No Data | Hard surface road (Route 608) provides access. Dirt roads cross drop zone. |



FORT A.P. HILL, VIRGINIA TERRAIN ANALYSIS LINES OF COMMUNICATION

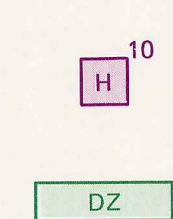
- ROADS**
- Hard surface divided, 4 lanes
 - Hard surface, 2 lanes
 - Hard surface, 1 lane
 - Loose surface, 2 lanes
 - Loose surface, 1 lane
 - Improved dirt
 - Unimproved dirt
 - Tank trails
 - Tank crossing
 - Military Reservation Route Number
 - U. S. Route Number



- BRIDGE DATA**
(All measurements in meters)
- A. Bridge number
 - B. One way military load class
W - Wheeled
T - Tracked
 - C. Two way military load class
 - D. Roadway width
 - E. Length
 - F. Overhead clearance
 - ∞ Unlimited vertical clearance



- TUNNELS**
(All measurements in meters)
- A. Tunnel number
 - B. Length
 - C. Width of traveled way
 - D. Overhead clearance



- HELICOPTER LANDING ZONES**
Landing Zone
- DROP ZONE**
Drop Zone

NOTE: Number refers to entry in table.

K. URBAN AREAS (CANTONMENT AREAS)

Fort A. P. Hill, presently, has six designated permanent camps and six temporary campsites scattered throughout the northern portion of the post. Present permanent party personnel consists of 12 officers and 56 enlisted men. This compli- ment is augmented by approximately 150 military TDY personnel from April through August when the Active Army, Reserve, and National Guard conduct annual training on the post. The installation master plan shows billeting capabilities for 1791 men in barracks, hutments, and diverted mess halls and 8094 men in tent facilities, excluding facilities under construction at Wilcox Camp. The master plan shows 70,099 trainees utilized the post FY 1973 and 45,740 trainees FY 1974.

| TROOP BILLETS | | | | | | |
|--|---------------------|----------|--------------|----------------------|-----------|--|
| TYPE | NUMBER OF BUILDINGS | CAPACITY | CURRENT LOAD | YEAR OF CONSTRUCTION | CONDITION | REMARKS |
| U. S. ARMY GARRISON AREA (POST HEADQUARTERS) | | | | | | |
| Permanent | 1 | 39 | 39 | 1976 | Excellent | Wilcox Camp permanent construction is progressing at the time of this study and is scheduled for occupancy in FY 1980. The camp is a summer training facility with barracks and support buildings grouped into three battalion areas and a brigade area. This permanent construction replaces a 1728 man tent facility on the same site. |
| Temporary | 4 | 90 | 90 | 1940 | Fair | |
| ANDERSON CAMP | | | | | | |
| Semi-permanent | 3 | 129 | 129 | 1966 | Good | Semi-permanent barracks located at Ander- son Camp, Cooke Camp and Old Guard Camp are of wood frame construction. Four of the structures at Cooke Camp are mess halls di- verted to barracks use. |
| Temporary | 45 | 540 | 540 | 1966 | Poor | |
| COOKE CAMP | | | | | | |
| Temporary | 9 | 420 | 420 | 1970 | Good | Temporary barracks, consisting of World War II mobilization type structures and metal hut- ments are utilized during annual training by TDY personnel. |
| HETH HEADQUARTERS AREA | | | | | | |
| Temporary | 2 | 47 | 47 | 1940 | Poor | Current plans include retaining all units now in use. Longer range plans indicate construct- ing a permanent camp at the Davis Campsite to accommodate 2560 men and permanent fa- cilities at Post Headquarters for 300 men. |
| OLD GUARD CAMP | | | | | | |
| Semi-permanent | 5 | 500 | 500 | 1970 | Good | |
| WILCOX CAMP | | | | | | |
| Permanent | 27 | 2560 | 2560 | 1979 | Excellent | |

| QUARTERS | | | | | | |
|-------------------|--------------|----------|--------------|----------------------|-----------|---|
| TYPE | TOTAL NUMBER | CAPACITY | CURRENT LOAD | YEAR OF CONSTRUCTION | CONDITION | REMARKS |
| BOQ | | | | | | |
| POST HEADQUARTERS | | | | | | |
| Temporary | 6 | 25 | 25 | 1940 | Poor | Permanent BOQ facilities are being construct- ed at Wilcox Camp at the time of this study. Occupancy is scheduled for FY 1980. |
| ANDERSON CAMP | | | | | | |
| Semi-permanent | 1 | 24 | 24 | 1966 | Good | The semi-permanent BOQ facility is a wood- frame structure located at Anderson Camp. It is utilized for annual training exercises. |
| HETH HEADQUARTERS | | | | | | |
| Temporary | 3 | 22 | 22 | 1940 | Poor | Temporary BOQ facilities at Post Head- quarters and Heth Headquarters, consisting of World War II mobilization type structures, are utilized for TDY assignments and sparsely oc- cupied. |
| WILCOX CAMP | | | | | | |
| Permanent | 9 | 162 | 162 | 1979 | Excellent | |
| GUEST HOUSE | | | | | | |
| Semi-permanent | 1 | 11 rooms | | pre-1940 | Good | Current plans indicate continued use of ex- isting units. Longer range plans include per- manent construction of a 180 man BOQ at the Davis Campsite. An area has been reserved at Post Headquarters for a 48 man BOQ should the need be justified. Guest House located outside Cantonment Areas on Travis Lake. |

| RECREATION FACILITIES | | |
|--------------------------------|---------------------|---|
| TYPE | CAPACITY | REMARKS |
| INDOOR FACILITIES | | |
| 1 Bowling Center | 2 lanes | Temporary Structure Rustic retreat (pre-1940) Located at Post Headquarters Temporary Structure Temporary Structure |
| 1 Lodge | 11 guest rooms | |
| 1 Theater w/o stage | 100 seats | |
| 1 Recreation building | | |
| 1 Community center | | |
| OUTDOOR FACILITIES | | |
| 1 Skeet range | | Near Route 608 and Beaver Dam Pond recreational area. Outdoor court located at Anderson Camp. Tennis or basketball at Post Headquarters Area. At various camps and camp sites. Lighted field at Post Headquarters Area. |
| 1 Basketball court | | |
| 2 Multi-purpose courts | | |
| 13 Softball fields (1 lighted) | | |
| 2 Boat piers | | |
| 1 Swimming pool | | White's Lake To be completed fiscal year 1980. Located at Beaver Dam Pond. Deer, rabbit, wild turkey, and quail. Lakes and ponds - stocked with bass, crappie, perch, pickerel, and bream. Designated areas for self-contained units. Camp Opechancanough at Hems Pond. |
| 1 Picnic area | | |
| Hunting | | |
| Fishing | | |
| Camping | | |
| 1 Scout Camp | 80.9 ha (200 acres) | Current plans indicate retaining existing recreation facilities. Areas have been reserved by long range planning for additional facilities when ade- quate funds are available for development. |

| FAMILY HOUSING |
|--|
| REMARKS |
| The installation master plan lists six family units scattered throughout the post. These units were old farm dwellings existing before the land acquisition in 1940. Three of these units have been disposed of and three have been diverted to administrative use. Current plans do not include additional family units as adequate community support housing is available in the nearby Fredericksburg area. Long range plans have reserved an area near the Post Headquarters for family housing units. |

| TELECOMMUNICATIONS | | |
|--------------------|-------------------|--|
| TYPE | CAPACITY | REMARKS |
| Official Telephone | 3-100 pair cables | The Continental Telephone Company of Virginia provides incom- ing service through a 26-pair aerial cable entering the post near the trailer park and terminating at the Post Communications Center, which is housed in Building T-105, a temporary wood-frame structure built in 1961. The facility has two operator positions and six Autovon lines. It contains a 300-line dial central exchange, which is operating at near capacity. The government-owned distribution system consists of three 100- pair cables from the Communications Center for distribution to mostly aerial pole-mounted cables throughout the post. Construc- tion, since 1976, has consisted of direct burial cable. The distribu- tion system is operating near capacity. The post trailer park is ser- viced directly from the Continental Telephone Company. The American Telephone and Telegraph Company has a buried cable that traverses the post approximately parallel to U. S. Route 301. The installation master plan indicates that planned upgrading and expansion of existing facilities will require increased circuit capacity and a permanent telephone exchange. |

| SCHOOLS AND MEDICAL FACILITIES | | |
|--------------------------------|--------------|---|
| TYPE | CAPACITY | REMARKS |
| Schools | None | There are no educational facilities for dependents on Fort A. P. Hill. Adequate facilities are provided by Caroline County in prox- imity to the post. |
| Dispensary | 1-8 bed unit | The post dispensary is housed in a temporary building in the Post Headquarters area and also houses two dental operating units. Staffing and support are furnished by the Kenner Army Hospital, Fort Lee, Virginia. The nearest hospital for dependents and emer- gencies is the Mary Washington Hospital, Fredericksburg, Virginia, a distance of approximately 32.2 km (20 mi). |
| Dental Clinic | 2 units | A new 297 m ² (3200 ft ²) dispensary is under construction at Wilcox Camp. Future plans include a new 372 m ² (4000 ft ²) permanent dispensary at Post Headquarters. |

K. URBAN AREAS (CANTONMENT AREAS) (Continued)

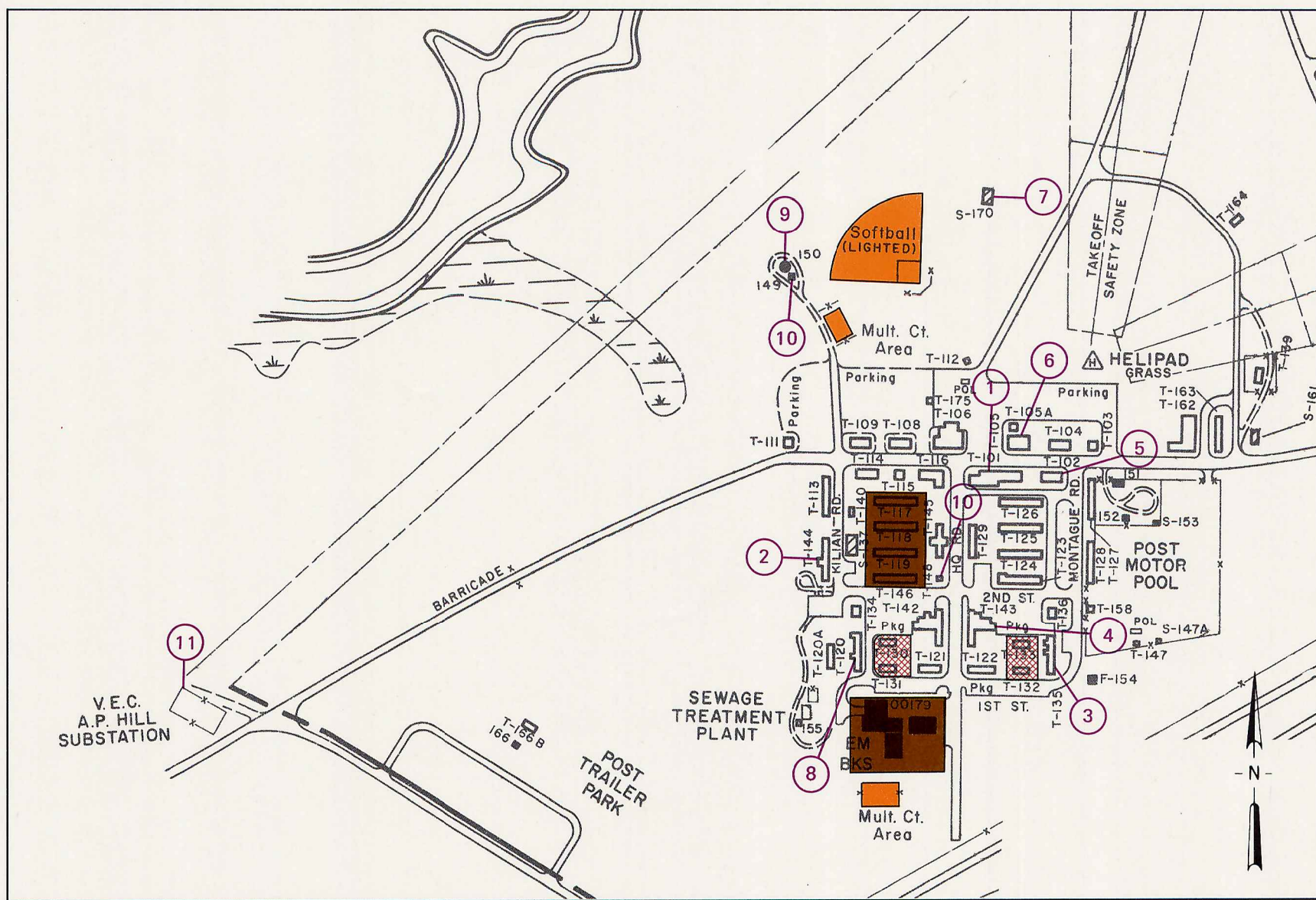
| FUEL OIL | | | | |
|------------------|--------------|---|---------------|---|
| STORAGE CAPACITY | | CURRENT LOAD (average annual demand) | | REMARKS |
| 303,695 liters | (80,230 gal) | 965,253 liters | (255,000 gal) | Fort A. P. Hill does not have natural gas available. Heating oil is furnished under an annual contract with a local supplier. Heating sources consist of hot water boilers, furnaces, and space heaters within individual buildings. Storage consists of local storage tanks adjacent to buildings. Tanks vary in size from 1041 to 15,141 liters (275 to 4000 gal); there is one 37,853 liters (10,000 gal) tank adjacent to the permanent mess hall at Old Guard Camp. Average annual demand is based on delivery rates for fiscal year 1974, 1975, and 1976. Future development will require the same type heating and storage system. |

| ELECTRICITY | | | |
|-----------------------|----------|--------------------------------------|---|
| SUBSTATIONS | CAPACITY | CURRENT LOAD | REMARKS |
| A. P. Hill Substation | 3000 kva | 505,000 kw hours (yearly average) | <p>Electricity to Fort A. P. Hill is supplied by Virginia Electric Cooperative from two substations located on the perimeter of the post. The electrical characteristics of this service are 12.5/7.2 kv three-phase four-wire 60 Hz. The service is considered adequate for present and future loadings.</p> <p>The distribution system within the post is government-owned. All transformers are owned by Virginia Electric Cooperative with the exception of three 50 kva pad mounted transformers at the Facilities Engineer Office and one 15 kva pole mounted transformer at Range 13. The distribution system operates at 12.5/7.2 kv three-phase, four-wire or 7.2 kv single phase. The overhead distribution lines were originally installed in the 1930's as a rural electrification system and have been extended as development on the post continued.</p> <p>Current plans include upgrading approximately two miles of single-phase primary distribution to three-phase to service new facilities at Wilcox Camp. The distribution system is considered adequate to serve present and future needs of the post.</p> |
| Widewake Substation | 5000 kva | | |
| TOTAL | 8000 kva | | |

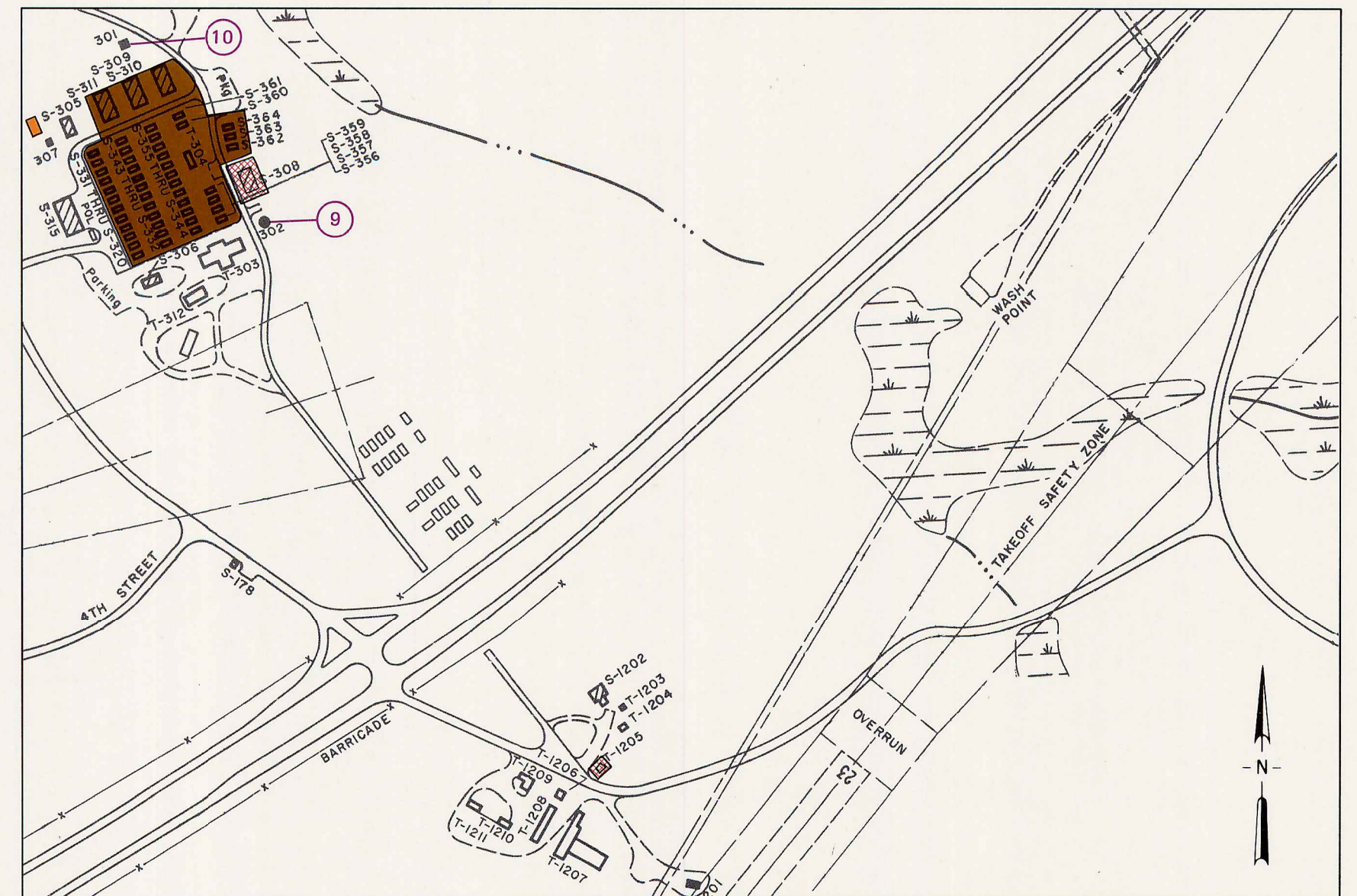
| WATER SUPPLY | | | | | | | |
|-----------------------------------|---|--------------------------|-------------|--|-----------|---|---------|
| TYPE | | LOCATION | | WELL YIELD liters per day (gpd) | | PUMPING CAPACITY ¹ liters per day (gpd) | REMARKS |
| SUPPLY Ground water from wells | Post Headquarters | 374,291 | (98,880) | 163,525 | (43,200) | Water is supplied by wells at the various camps, campsites, and developed areas. Wilcox Camp has three wells, Headquarters Area and Old Guard have two wells each, Heth Headquarters, Mahone, Jackson, and Davis Camps share two wells, and all remaining camps have one well each. Water treatment facilities are in the various pump buildings of the well locations. With the exception of Wilcox Camp, the various water systems are not capable of meeting the fire flow requirement as specified in TM5-813-6. Average daily consumption is computed to be approximately 2,377,361 liters per day (628,050 gpd) using total housing capacity. | |
| | Anderson Camp | 145,356 | (38,400) | 90,847 | (24,000) | | |
| | Archer Campsite | 421,532 | (111,360) | 116,285 | (30,720) | | |
| | Cooke Camp | 755,850 | (199,680) | 236,203 | (62,400) | | |
| | Heth Headquarters Area, Davis, Mahone, and Jackson Campsite | 548,718 | (144,960) | 330,684 | (87,360) | | |
| | Pender Campsite | 330,684 | (87,360) | 228,935 | (60,480) | | |
| | Rappahannock Campsite | 348,854 | (92,160) | 319,783 | (84,480) | | |
| | Rodes Campsite | 319,783 | (84,480) | 163,525 | (43,200) | | |
| | Wilcox Camp | 1,155,578 | (305,280) | 679,538 | (179,520) | | |
| | Old Guard Camp | 617,762 | (163,200) | 508,745 | (134,400) | | |
| | Supply and Maintenance | 98,115 | (25,920) | 145,356 | (38,400) | | |
| TOTAL | | 5,116,523 | (1,351,680) | 2,983,426 | (788,160) | | |
| | | CAPACITY liters (gal) | | | | | |
| STORAGE Elevated tanks | Post Headquarters | 189,265 | (50,000) | Based on pumping capacity and population capacity, storage capacity is inadequate for domestic use at Post Headquarters, Anderson Camp, Archer Campsite, and Rodes Campsite. All storage systems are inadequate for required fire flow, except the new system at Wilcox Camp. The water distribution systems are independent systems and are not inter-connected. They consist of looped and branched systems dependent on static head in the elevated storage tanks since there are no auxiliary high service pumps except for Wilcox Camp. The looped distribution systems at Wilcox Camp, Cooke Camp, and Anderson Camp are considered adequate for fire flow and still maintain the minimum residual pressure of 0.7 kg per cm ² (10 psi) as specified by TM5-813-5. All other systems are considered inadequate to meet current fire flow demands. Current water requirements can be supplied by ground water sources. The installation master plan includes increased pumping and storage capacity for the systems at Post Headquarters, Anderson Camp, Supply and Maintenance Area, and Davis Campsite. Wilcox Camp capacity includes a new 1,135,592 liters (300,000 gal) ground level storage tank with auxiliary service pump. | | | |
| | Anderson Camp | 227,118 | (60,000) | | | | |
| | Archer Campsite | 94,633 | (25,000) | | | | |
| | Cooke Camp | 378,531 | (100,000) | | | | |
| | Heth Headquarters, Davis, Mahone and Jackson Campsite | 227,118 | (60,000) | | | | |
| | Pender Campsite | 160,876 | (42,500) | | | | |
| | Rappahannock Campsite | 160,876 | (42,500) | | | | |
| | Rodes Campsite | 94,633 | (25,000) | | | | |
| | Wilcox Camp | 1,230,244 | (325,000) | | | | |
| | Old Guard Camp | 227,118 | (60,000) | | | | |
| | Supply and Maintenance | 160,876 | (42,500) | | | | |
| TOTAL | | 3,151,288 | (832,500) | | | | |

¹ Based on a 16-hour pumping period.

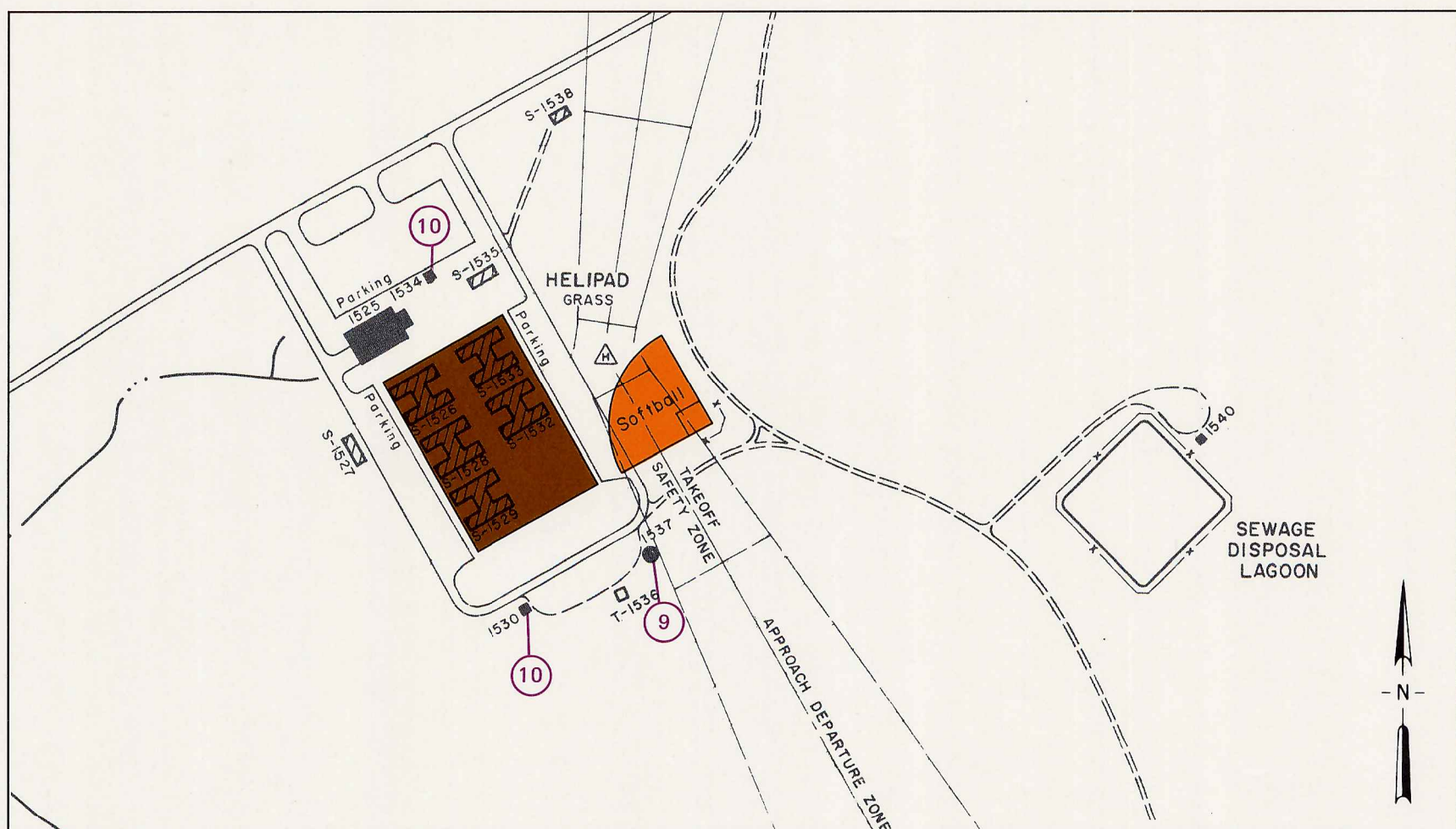
URBAN AREAS (CANTONMENT AREAS)



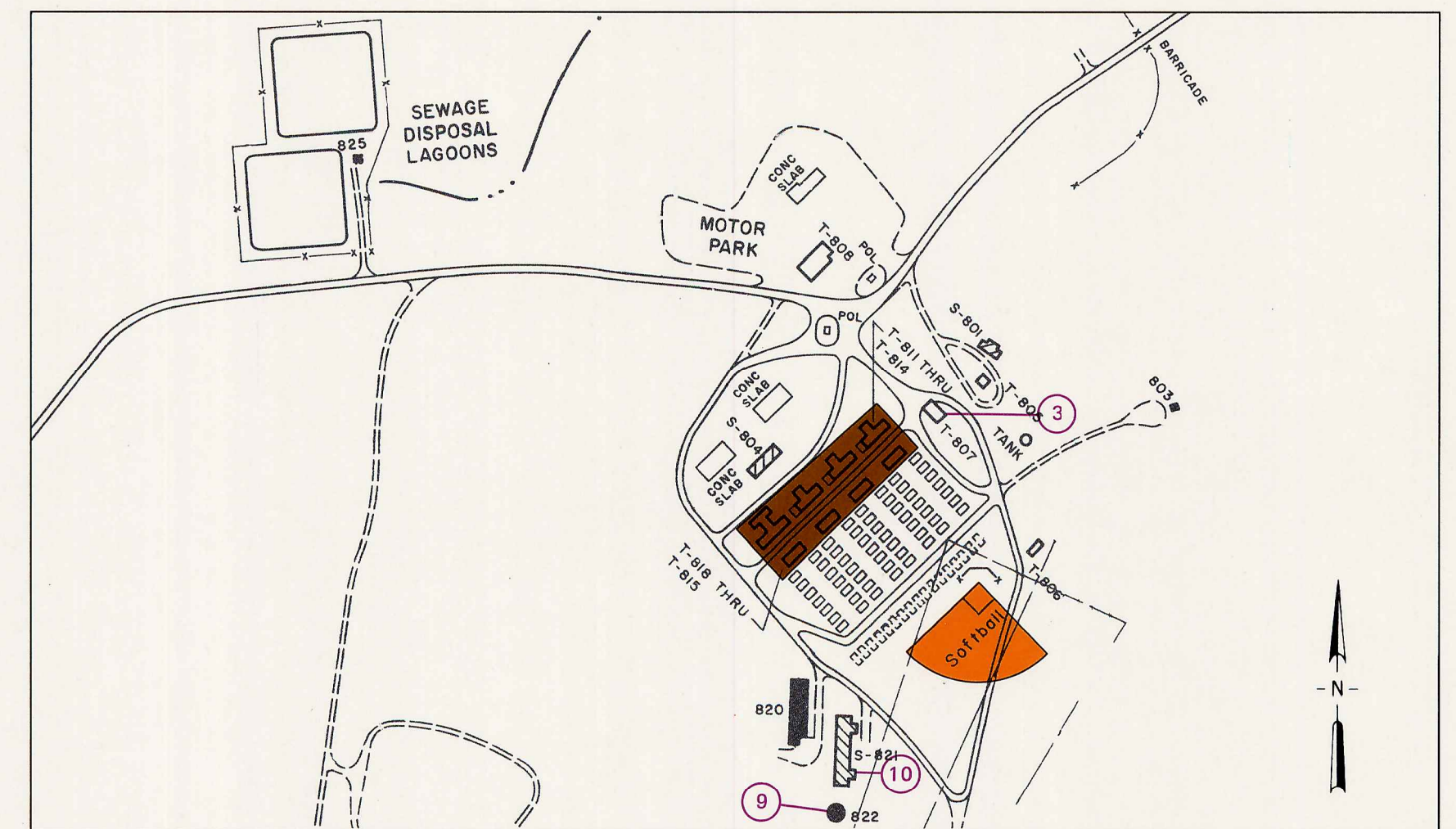
POST HEADQUARTERS



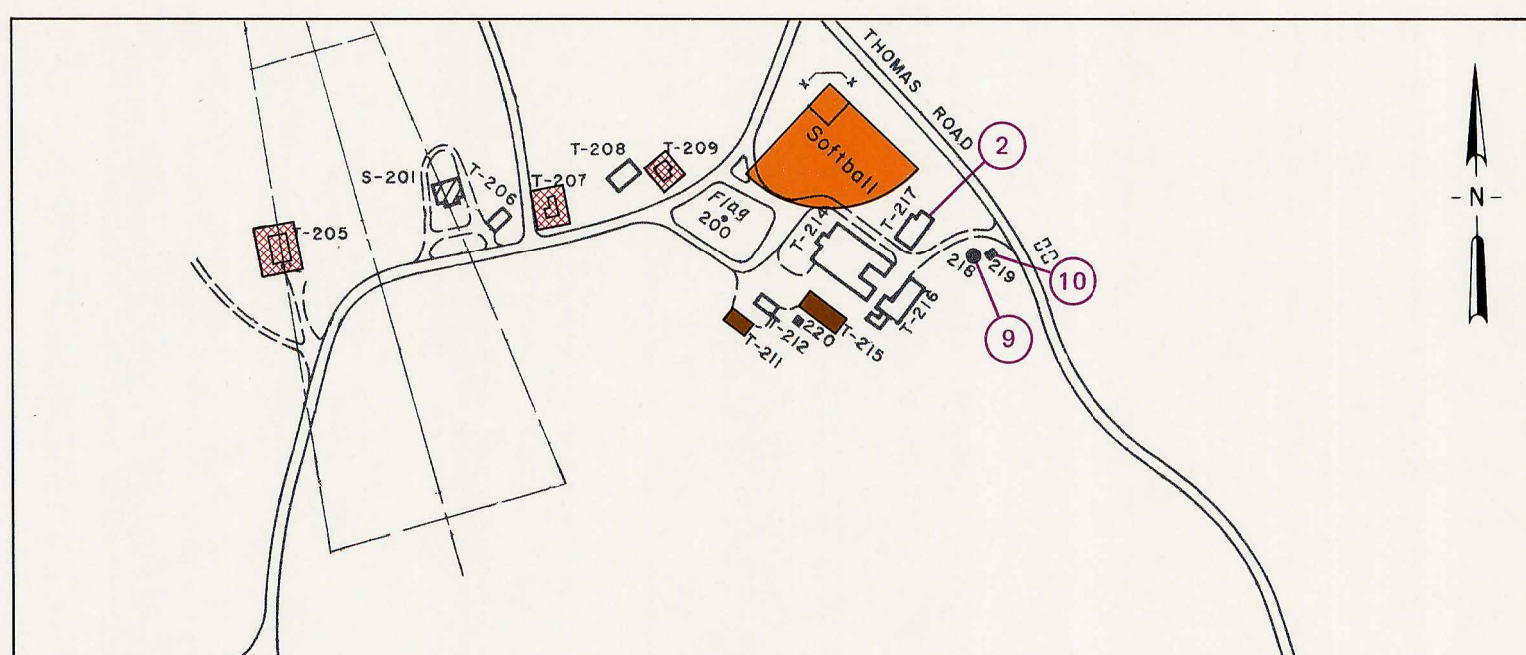
ANDERSON CAMP



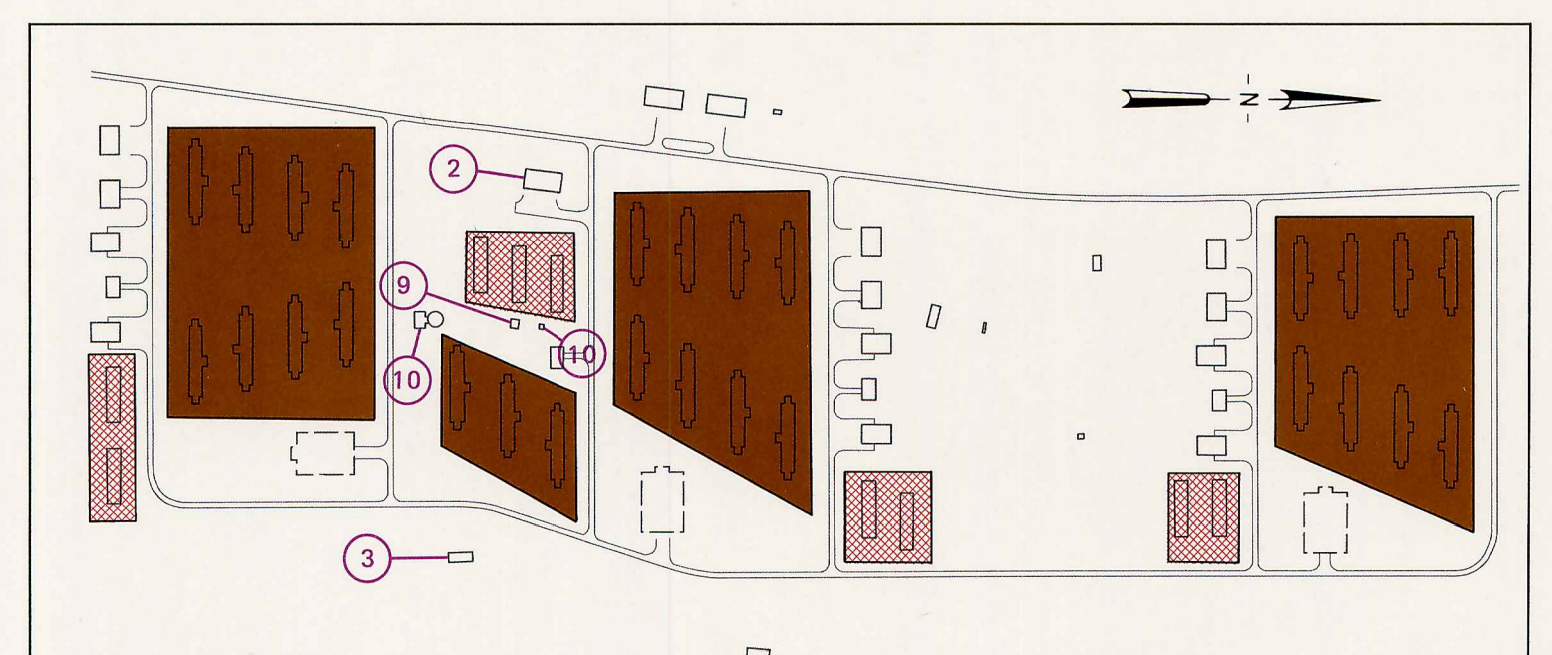
OLD GUARD CAMP



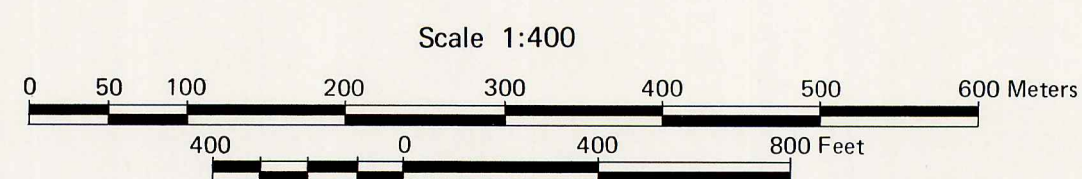
COOKE CAMP



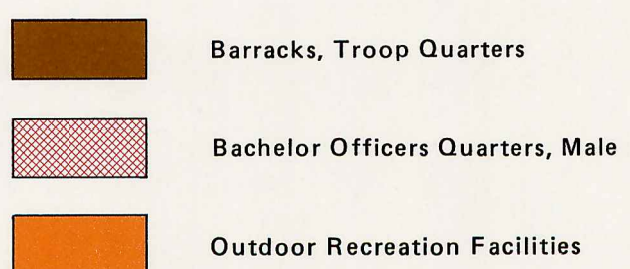
HETH HEADQUARTERS



WILCOX CAMP



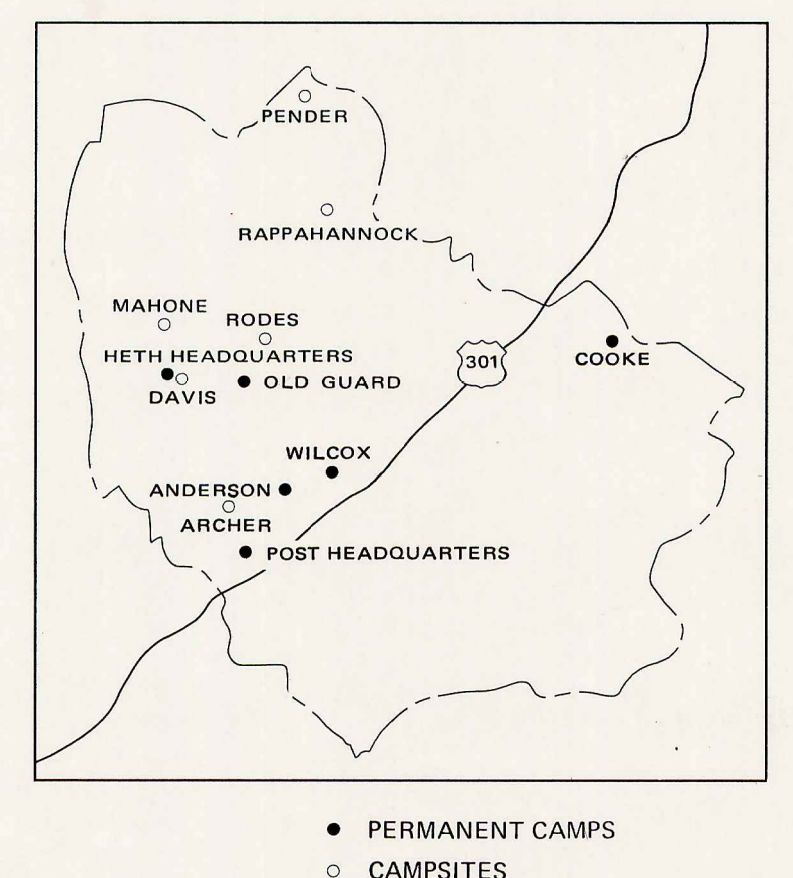
AREA FEATURES



SITE FEATURES

- | | |
|------------------------|--------------------------------|
| (1) Post Headquarters | (7) Indoor Recreation |
| (2) Post Dispensary | (8) Community Center |
| (3) Post Exchange | (9) Flight Obstruction |
| (4) NCO Open Mess | (10) Water Treatment Plant |
| (5) Mail Room | (11) Electric Power Substation |
| (6) Telephone Exchange | |

LOCATION DIAGRAM



Prepared by Michael Baker, Jr., Inc., Jackson, Mississippi, under the direction of the Terrain Analysis Center, U. S. Army Engineer Topographic Laboratories, Fort Belvoir, Virginia, January 1979.

L. NON-URBAN CULTURE FEATURES

Fort A. P. Hill has numerous manmade features outside the six permanent camp areas, which could affect positively or negatively, military training or operations. These features consist mainly of campsites, training areas, buildings associated with range areas, utility lines, and support facilities. The manmade features included are those that existed as of June 1978.

| MAP NUMBER | GRID REFERENCE | DESCRIPTION | MAP NUMBER | GRID REFERENCE | DESCRIPTION |
|------------|----------------------|--|------------|----------------|--|
| 1 | 982326 | Vehicle wash rack. | 41 | 067237 | P. O. W. compound (mock compound for training): Perimeter fence (woven and barbed wire) 3.0 m (10 ft) high; three plywood buildings; sentry box on wood posts. |
| 2 | 980314/984328 | Power line ¹ . | 42 | 076244 | Field fortification site: Latrine ¹⁰ . |
| 3 | 983315 | Pender Campsite: Branch post exchange, 89.2 m ² (960 ft ²), wood, temporary; general purpose warehouse ¹⁴ ; water well with water treatment pumphouse, 10.4 m ² (112 ft ²), concrete block, permanent; detached lavatory, 92.9 m ² (1000 ft ²), cinder block, permanent; lavatory, 66.9 m ² (720 ft ²), wood, temporary; 12 latrines ¹⁰ ; elevated water storage tank, 160,875.3 liters (42,500 gal); bleachers, 300 man capacity, 118.9 m ² (1280 ft ²), wood, semi-permanent; softball field; 83 tent slabs ¹¹ ; 70 tent floors ¹² ; 10 mess tent slabs ¹³ ; loading dock; 12 refrigeration units, 4.2 m ³ (150 ft ³) each. | 43 | 080246 | Pipeline, above ground: Approximately 125 m (410 ft) of sewer line. |
| 4 | 984317/995308 | Telephone line ² . | 44 | 080245/086247 | Power line ⁸ . |
| 5 | 961305/984317 | Telephone line ³ . | 45 | 078247 | Oxidation ponds: Two raw sewage lagoons, capacity 13.6 x 10 ⁶ liters per day (3.6 x 10 ⁶ gpd), concrete and earth, permanent. |
| 6 | 925307/961305 | Cable, underground ⁴ . | 46 | 079240 | Bailey bridge training site: Latrine ¹⁰ ; miscellaneous training materials; storage building, 74.3 m ² (800 ft ²), concrete block, semi-permanent; two bleachers ¹⁵ . |
| 7 | 981318 | Fuel point ²⁰ : Capacity 41,638.3 liters (11,000 gal). | 47 | 083237 | Rappelling tower. |
| 8 | 988284 | Fuel point ²⁰ : Capacity 41,638.3 liters (11,000 gal). | 48 | 083246 | Fuel point ²⁰ : Capacity 37,853 liters (10,000 gal). |
| 9 | 961305/948256/986280 | Telephone line ⁵ . | 49 | 094219/096239 | Power line ¹ . |
| 10 | 992279 | Rappahannock Campsite: Branch post exchange, 178.4 m ² (1920 ft ²), wood, temporary; general purpose warehouse ¹⁴ ; three enlisted men's barracks, 89.2 m ² (960 ft ²), wood, temporary; two detached lavatories, one 138.8 m ² (1494 ft ²), one, 153.8 m ² (1656 ft ²) both wood, temporary; two motor repair shops ¹⁵ ; loading dock; 13 latrines ¹⁰ ; 14 refrigeration units, 4.2 m ³ (150 ft ³) each; water well (potable) with water treatment pumphouse, 8.1 m ² (87 ft ²), concrete block, permanent; elevated water storage tank, 160,875.3 liters (42,500 gal); 104 tent slabs ¹¹ ; 12 tent floors ¹² ; seven mess tent slabs ¹³ . | 50 | 089233 | Landmine warfare center: Latrine ¹⁰ ; bleachers ¹⁸ ; storage building, 74.3 m ² (800 ft ²), concrete block, semi-permanent. |
| 11 | 986283/006283 | Power line ¹ . | 51 | 078227 | Vehicle wash rack. |
| 12 | 038285 | Float bridge training area [274.3 ha (111 acre) lease]. | 52 | 083245/093218 | Cable, underground ⁴ . |
| 13 | 992271 | Vehicle wash rack. | 53 | 094218 | Navy seal team camp: Three trailers, length 16.8 m (55 ft), width 3.0 m (10 ft), wood frame, metal siding, temporary; latrine ¹⁰ ; radio mast, height 18.3 m (60 ft). |
| 14 | 962246 | Travis Lake: Lodge, guest housing, 466.6 m ² (5022 ft ²), wood, semi-permanent; house, 141.8 m ² (1526 ft ²), wood, semi-permanent; BOQ, 214.0 m ² (2304 ft ²), wood, temporary; bath house, 53.5 m ² (576 ft ²) wood, temporary; three general purpose warehouses, one, 14.9 m ² (160 ft ²), one, 36.4 m ² (392 ft ²), one, 240.1 m ² (2584 ft ²), all are wood, temporary. | 54 | 093218/087206 | Cable, underground: Range communications, government owned, 2 pr-19 ga. |
| 15 | 954256/961246 | Telephone line ⁶ . | 55 | 073227 | Buildings: Two warehouses, one 74.3 m ² (800 ft ²), concrete block, semi-permanent, one, 14.9 m ² (160 ft ²), wood, temporary. |
| 16 | 945245 | Liberty Church: Post chapel 252.7 m ² (2720 ft ²), 300 seat, brick, permanent, built in 1850. | 56 | 995185/083245 | Cable, underground ⁹ . |
| 17 | 939241/936258 | Power line ¹ . | 57 | 963155/060249 | Cable, underground: Atlantic Telephone and Telegraph Company communications cable, underground direct burial. |
| 18 | 940240/936258 | Telephone line ⁷ . | 58 | 951160/060249 | Power line: Virginia Electric Cooperative 69KV aerial tie line from Fort A. P. Hill substation to Port Royal switching station. |
| 19 | 939245 | Mahone Campsite (includes Liberty and Jackson Campsites): Two general purpose warehouses ¹⁴ ; two motor repair shops, one ¹⁵ , one 172.4 m ² (1856 ft ²), wood, temporary, within fenced area, 3.0 m (10 ft) high, chain-link; loading dock; branch post exchange, 93.6 m ² (1008 ft ²), wood, temporary; detached lavatory, 76.1 m ² (819 ft ²), wood, temporary; 18 refrigeration units, 4.2 m ³ (150 ft ³) each; fenced area, 2.4 m (8 ft) high, woven wire, containing administration building, 330.3 m ² (3555 ft ²), wood, temporary; refrigeration unit shelter, 65.4 m ² (704 ft ²), wood, metal roof, temporary; softball field; elevated water storage tank, 37,853.1 liters (10,000 gal); 12 latrines ¹⁰ ; 91 tent slabs ¹¹ ; 22 tent floors ¹² ; seven mess tent slabs ¹³ ; two water storage tanks, 7570.6 liters (2000 gal), concrete piers. | 59 | 995185/990197 | Power line ⁸ . |
| 20 | 936243 | Night vision laboratory: Perimeter security fence, 3.0 m (10 ft) high, chain-link; observation tower; sentry station, 8.9 m ² (96 ft ²); storage building, 223.0 m ² (2400 ft ²), metal Butler, permanent; storage shed 49.1 m ² (528 ft ²), wood, temporary. | 60 | 995185/989197 | Telephone line: Government owned, one, 5 pr-104 copperweld and one, 12 pr-19 ga figure 8, aerial cable. |
| 21 | 940245 | Fuel point ²⁰ : Capacity 49,208.9 liters (13,000 gal). | 61 | 976189 | Ammunition supply point: Perimeter fence, 3.0 m (10 ft) high chain-link; ordnance administration building, 74.3 m ² (800 ft ²), concrete masonry, permanent; general purpose magazine, 297.3 m ² (3200 ft ²), metal, permanent; 11 igloo storage magazines, two 37.4 m ² (403 ft ²), nine 139.4 m ² (1500 ft ²), all are earth covered corrugated steel arched pipe, permanent; sentry station; guard station; guard tower; storage building, 178.4 m ² (1920 ft ²), wood, temporary; storage shed, 8.9 m ² (96 ft ²); water well (potable) with water treatment plant in ordnance administration building. |
| 22 | 935241 | House with detached garage: House, 288.5 m ² (3106 ft ²), wood, built prior 1940, semi-permanent; garage, 73.6 m ² (792 ft ²), wood, temporary. | 62 | 961191/977190 | Power line ¹ . |
| 23 | 906236/939241 | Telephone line ⁶ . | 63 | 960191/977190 | Telephone line ⁶ . |
| 24 | 923234 | House: 225 m ² (2422 ft ²), wood, built prior 1940, semi-permanent. | 64 | 961189 | Drivers training course. |
| 25 | 906236/939240/963162 | Power line ⁸ . | 65 | 950182/961181 | Power line ¹ . |
| 26 | 940234 | Davis Campsite: Three motor repair shops ¹⁵ ; branch post exchange, 89.2 m ² (960 ft ²), wood, temporary; 15 latrines ¹⁰ ; water well (potable) with water treatment pumphouse, concrete block, permanent; softball field; four field showers; 16 tent slabs ¹¹ ; 124 tent floors ¹² ; 12 mess tent slabs ¹³ ; 18 refrigeration units, 4.2 m ³ (150 ft ³). | 66 | 951187 | Vehicle wash rack. |
| 27 | 938233/942238 | Power line ¹ . | 67 | 943194 | Float and panel bridge site. |
| 28 | 967235 | Hand grenade assault course. | 68 | 914191 | Campground: For self-contained units only. |
| 29 | 972235/961246 | Power line ¹ : From Old Guard Camp to Travis Lake. | 69 | 950181 | Archer Campsite: Branch post exchange, 89.2 m ² (960 ft ²), wood, temporary; two detached lavatories, one, 92.9 m ² (1000 ft ²), one, 22.3 m ² (240 ft ²) both concrete block, permanent; two motor repair shops ¹⁵ ; loading dock; softball field; water well (potable) with water treatment pumphouse, concrete block, permanent; elevated water storage tank, 94,632.5 liters (25,000 gal); 16 latrines ¹⁰ ; 92 tent slabs ¹¹ ; 107 tent floors ¹² ; 11 mess tent slabs ¹³ ; 22 refrigeration units, 4.2 m ³ (150 ft ³) each. |
| 30 | 978234 | Vehicle wash rack. | 70 | 950180/959182 | Telephone line ⁶ . |
| 31 | 975235/989228 | Telephone line: Aerial, 2-104 copperweld on 10 pin cross-arms. | 71 | 960182 | District Engineer scale and storage area: Building, 8.9 m ² (96 ft ²), wood, temporary; storage yard, perimeter fence, 2.4 m (8 ft) high, woven wire. |
| 32 | 971234 | Rodes Campsite: Two motor repair shops ¹⁵ ; general purpose warehouse ¹⁴ ; two detached lavatories, one, 92.9 m ² (1000 ft ²), one, 22.3 m ² (240 ft ²), both concrete block, permanent; water well (potable) with water treatment pumphouse, concrete block, permanent; elevated water storage tank, 94,632.5 liters (25,000 gal); two field showers; 14 latrines ¹⁰ ; branch post exchange, 89.2 m ² (960 ft ²), metal, temporary; softball field; 94 tent slabs ¹¹ ; 103 tent floors ¹² ; 12 mess tent slabs ¹³ ; 20 refrigeration units 4.2 m ³ (150 ft ³) each. | 72 | 960178 | Parade field: Grass surface. |
| 33 | 955222/972235 | Power line ⁸ : To Old Guard Camp. | 73 | 958175 | Physical combat proficiency training course. |
| 34 | 998197 | Oxidation ponds: Two raw sewage lagoons, capacity 13.2 x 10 ⁶ liters per day (3.5 x 10 ⁶ gpd), concrete and earth, permanent. | 74 | 963172 | Skeet range: Two buildings, 5.9 m ² (64 ft ²), wood, temporary; latrine ¹⁰ . |
| 35 | 955222/975234 | Telephone line ² . | 75 | 950175 | Hand grenade assault course. |
| 36 | 956221 | Dirt Bridge warehouse: Two warehouses, one, 929.0 m ² (10,000 ft ²), wood, semi-permanent, one, 92.9 m ² (1,000 ft ²), wood, temporary; one storage shed, 74.3 m ² (800 ft ²), wood, temporary; one latrine ¹⁰ . | 76 | 960191/960166 | Telephone line: Government owned, four aerial cables, two, 25 pr-19 ga figure 8, one, 100 pr-22 ga figure 8, and one, 5 pr-104 copperweld. |
| 37 | 939241/960191 | Telephone line: Post communications, four aerial cables, two 25 pr-19 ga figure 8, one 100 pr-22 ga figure 8, one 5 pr-104 copperweld. | 77 | 959167 | Vehicle wash rack. |
| 38 | 966216 | Land navigation course. | 78 | 960166/959162 | Telephone line: Two government owned aerial cables, one, 100 pr-22 ga figure 8, and one, 100 pr-22 ga stalpeth to Post Communications Center. |
| 39 | 989218 | Vehicle wash rack. | 79 | 963170 | Sewage treatment plant: Plant capable of secondary treatment, capacity 151,412 liters per day (40,000 gpd), concrete block, permanent. |
| 40 | 039243 | Scout camp. | 80 | 959162 | Post Communications Center: 211.2 m ² (2273 ft ²), wood, temporary. |
| | | | 81 | 957150 | Sanitary landfill: 16.2 ha (40 acre), leased to Caroline County. |
| | | | 82 | 952160/959162 | Telephone line: Aerial cable, 26 pr-22 ga lead covered, connection between Post Communications Center and Continental Telephone Company of Virginia. |
| | | | 83 | 953160 | Post trailer park: Storage building, 47.6 m ² (512 ft ²), wood, temporary; water well (potable) with water treatment pumphouse, concrete block, permanent. |
| | | | 84 | 965160 | General warehousing area: Six general purpose warehouses, one 13.3 m ² (143 ft ²), one, 95.1 m ² (1024 ft ²), one, 267.4 m ² (2878 ft ²), one, 115.4 m ² (1242 ft ²), one, 68.7 m ² (740 ft ²), one, 87.9 m ² (946 ft ²), all are wood, temporary; BOQ, 73.2 m ² (788 ft ²) wood, temporary; family residence (converted to administrative use) 334.1 m ² (3596 ft ²), wood, semi-permanent; detached garage, 22.3 m ² (240 ft ²) wood, temporary; one general purpose warehouse, 778.1 m ² (8376 ft ²), metal, temporary. |
| | | | 85 | 967159 | Building: Air operations building and control tower 65.0 m ² (700 ft ²), cinder block, permanent. |

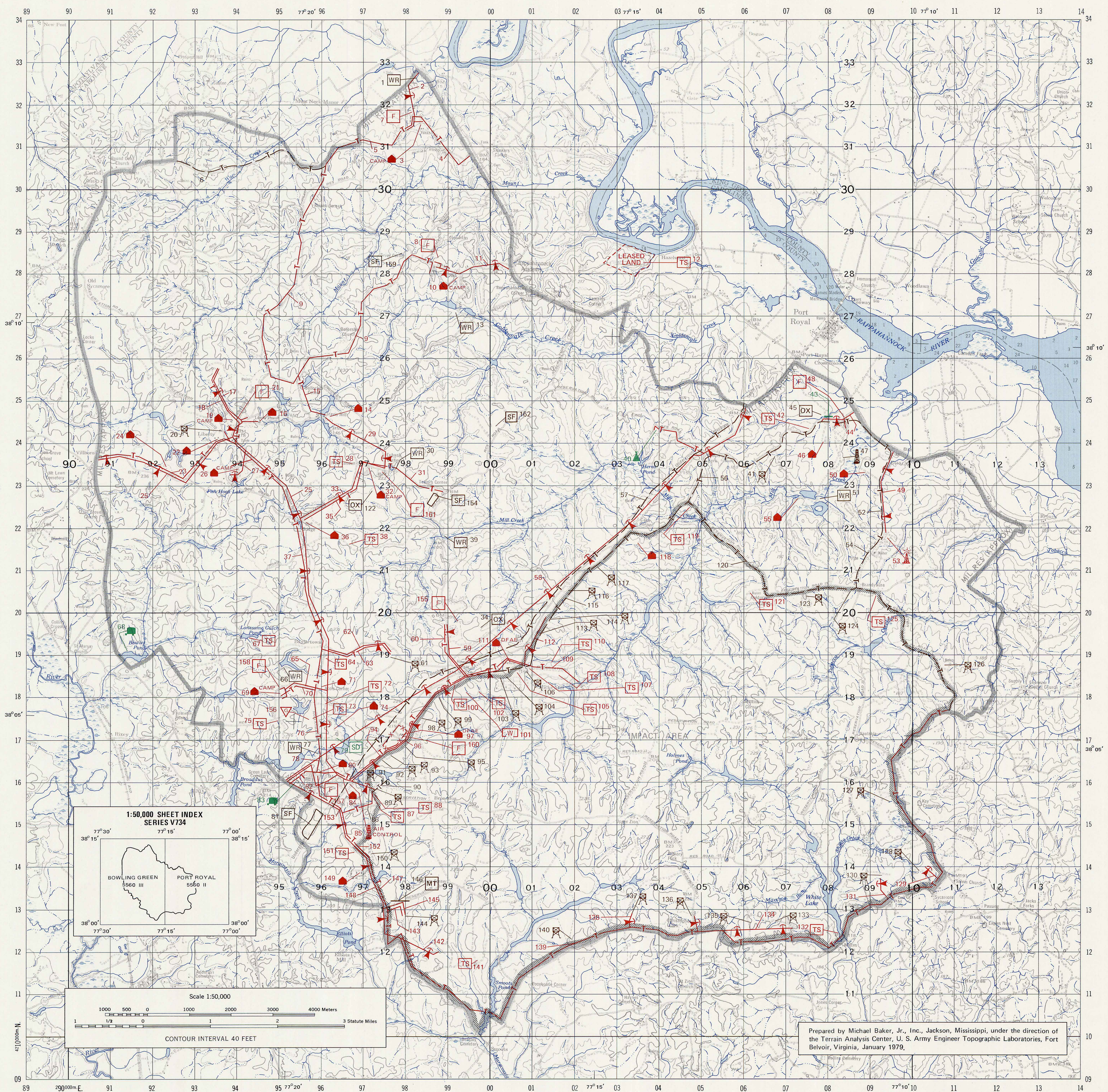
L. NON-URBAN CULTURE FEATURES (Continued)

| MAP NUMBER | GRID REFERENCE | DESCRIPTION | MAP NUMBER | GRID REFERENCE | DESCRIPTION |
|------------|----------------|---|------------|----------------|---|
| 86 | 964162/973158 | Power line ¹ : Buried cable under sod airstrip (grid reference 967160/969159). | 118 | 035217 | Range 18 (inactive): Warehouse, 14.9 m ² (160 ft ²), wood, temporary. |
| 87 | 972157 | Range 37N (target detection). | 119 | 047225 | Range 19 (weapons platoon): Latrine ¹⁰ ; bleachers ¹⁸ . |
| 88 | 972158 | Range 38N (target detection). | 120 | 047226/109177 | Cable, underground ⁹ . |
| 89 | 973158 | Range 35 (field fire): Target storehouse, 36.4 m ² (392 ft ²), wood, temporary; control tower ¹⁷ ; latrine ¹⁰ ; bleachers ¹⁸ ; firing berm, length 152.4 m (500 ft); width 7.3 m (24 ft). | 121 | 062205 | Range 20 (anti-tank): Latrine ¹⁰ ; bleachers, 150 man capacity, temporary. |
| 90 | 972158/976160 | Cable, underground: Range communications, government owned, 2 pr-19 ga stalpeth, underground direct burial. | 122 | 972229 | Oxidation pond: One raw sewage lagoon, capacity 9.1 x 10 ⁶ liters per day (2.4 x 10 ⁶ gpd), concrete and earth, permanent. |
| 91 | 975160 | Range 1 (squad defensive night firing): Control tower ¹⁷ ; bleachers ¹⁸ . | 123 | 075204 | Range 21 (close combat course): Target storehouse ¹⁹ ; control tower ¹⁷ ; two bleachers ¹⁸ ; barbed wire obstacle, length 121.9 m (400 ft); trench 61.0 m (200 ft); log fence, 61.0 m (200 ft). |
| 92 | 974165 | Range 2A (pistol qualification course): Target storehouse ¹⁹ ; control tower ¹⁷ ; latrine ¹⁰ . | 124 | 085205 | Range 22 (inactive): Control tower ¹⁷ ; latrine ¹⁰ . |
| 93 | 976167 | Range 2 (pistol familiarization): Latrine ¹⁰ ; two target storehouses ¹⁹ ; control tower ¹⁶ . | 125 | 091204 | Range 23 (explosives test site): Latrine ¹⁰ . |
| 94 | 959162/981171 | Telephone line: Two aerial cables, one, 50 pr-19 ga stalpeth and one, 50 pr-19 ga figure 8 to Facilities Engineer Office. | 126 | 107188 | Range 24 (company attack course): Latrine ¹⁰ ; control tower ¹⁷ . |
| 95 | 980169 | Range 3 (machine gun transition and machine gun assault): Control tower ¹⁷ ; latrine ¹⁰ ; target storehouse ¹⁹ ; bleachers ¹⁸ . | 127 | 095155 | Range 25 (air cavalry/attack helicopter crew course): Two control towers ¹⁷ ; bleachers ¹⁸ ; observation tower, height 22.9 m (75 ft), base 37.2 m ² (400 ft ²), steel, permanent. |
| 96 | 963162/981171 | Power line ⁸ . | 128 | 101139 | Range 26S (squad combat course): Control tower ¹⁶ ; latrine ¹⁰ . |
| 97 | 979171 | Facilities Engineer Office, supply and maintenance area: Perimeter fence, 3.0 m (10 ft) high chain-link, encloses approximately 9.3 ha (23 acre); Facilities Engineer Office, 351.8 m ² (3787 ft ²), concrete masonry, permanent; two general purpose administration buildings, one, 46.9 m ² (505 ft ²), concrete masonry, permanent, one, 95.1 m ² (1024 ft ²), wood, temporary; motor repair shop, 864.5 m ² (9306 ft ²), concrete masonry, permanent; five maintenance shops, one, 89.2 m ² (960 ft ²), metal, temporary, one, 41.6 m ² (448 ft ²), aluminum, semi-permanent, one, 371.6 m ² (4000 ft ²), one, 809.3 m ² (8712 ft ²), metal, semi-permanent, one, 185.8 m ² (2000 ft ²), metal, semi-permanent; general purpose warehouse ¹⁴ ; six general purpose storehouses, three, 371.6 m ² (4000 ft ²), one, 77.3 m ² (832 ft ²), wood, temporary, one, 49.1 m ² (528 ft ²), wood, temporary, one, 23.8 m ² (256 ft ²), wood, temporary; two storage sheds, one, 278.7 m ² (3000 ft ²), one, 49.1 m ² (528 ft ²), temporary; loading dock; two water wells (potable) with water treatment pumphouses, concrete block, permanent; elevated water storage tank, 160,875.3 liters (42,500 gal); oil house, 17.8 m ² (192 ft ²), concrete block, semi-permanent. | 129 | 107137/103140 | Power line ¹ . |
| 98 | 984175 | Range 4 (25 meter zero): Control tower ¹⁷ ; target storehouse, 36.4 m ² (392 ft ²), wood, temporary; latrine ¹⁰ ; three bleachers ¹⁸ . | 130 | 093138 | Range 26P (platoon combat course): Control tower ¹⁶ . |
| 99 | 988180 | Range 5 (light machine gun and pistol familiarization): Warehouse, 301.0 m ² (3240 ft ²), metal, permanent; two control towers ¹⁶ ; two bleachers ¹⁸ ; latrine ¹⁰ . | 131 | 094132/093137 | Power line ¹ . |
| 100 | 991183 | Range 6N (practice hand grenade): Latrine ¹⁰ . | 132 | 082124 | Float bridge and tactical raft training area. |
| 101 | 994181 | Range 6 (live-fire hand grenade): Concrete barrier, length 76.2 m (250 ft), height 1.4 m (4.5 ft), thickness 30.5 cm (12 in). | 133 | 067127 | Range 27P (platoon combat course): Control tower ¹⁶ ; latrine ¹⁰ . |
| 102 | 997181 | Range 7 (81 mm mortar). | 134 | 048128/072126 | Power line ¹ . |
| 103 | 003185 | Range 8 (field firing): Control tower ¹⁷ ; target storehouse, 36.4 m ² (392 ft ²), wood, temporary; firing berm, length 167.6 m (550 ft), width 6.1 m (20 ft), two bleachers ¹⁸ ; latrine ¹⁰ . | 135 | 062127 | Range 27S (squad combat course): Control tower ¹⁶ . |
| 104 | 004185 | Range 9 (individual night firing): Control tower ¹⁷ ; bleachers ¹⁸ ; target storehouse ¹⁹ ; latrine ¹⁰ ; firing berms, length 762.0 m (2500 ft), width 3.7 m (12 ft); observation tower, height 15.2 m (50 ft), base 20.9 m ² (225 ft ²), steel, permanent. | 136 | 047128 | Range 28P (platoon combat course): Observation tower; height 30.5 m (100 ft), base 58.1 m ² (625 ft ²), steel, permanent; latrine ¹⁰ . |
| 105 | 006186 | Range 10 (known distance range): Target storehouse ¹⁹ ; latrine ¹⁰ ; firing berm, length 30.5 m (100 ft), width 12.2 m (40 ft). | 137 | 033129 | Range 28S (squad combat course): Control tower ¹⁷ ; bleachers, 190 man capacity, temporary. |
| 106 | 009186 | Range 11 (mini-tank range): Observation tower, height 15.2 m (50 ft), base 20.9 m ² (225 ft ²), steel, permanent; latrine ¹⁰ . | 138 | 034129/033126 | Power line ¹ . |
| 107 | 009187 | Range 39N (target detection). | 139 | 975130/109177 | Telephone line: Range communications, government owned, two aerial cables, each 6 pr-19 ga rural distribution wire. |
| 108 | 016185 | Range 12 (81 mm mortar): Latrine ¹⁰ . | 140 | 019123 | Range 29 (inactive): Control tower ¹⁷ . |
| 109 | 995185/021184 | Telephone line: Range communications, government owned, 5 pr-104 copper-weld, 10 pin cross-arms on wooden poles. | 141 | 997118 | Range 30 (107 mm mortar). |
| 110 | 015188 | Range 13 (81 mm mortar). | 142 | 975130/988120 | Power line ¹ . |
| 111 | 005188 | Facilities Engineer warehousing area: Two general purpose warehouses, one, 185.3 m ² (1995 ft ²), one, 178.4 m ² (1920 ft ²), both are metal, temporary; general purpose warehouse, 14.9 m ² (160 ft ²), wood, temporary; general purpose warehouse, 89.2 m ² (960 ft ²), metal, semi-permanent; target storage building, 74.3 m ² (800 ft ²), concrete block, permanent; inflammable material storehouse, 89.2 m ² (960 ft ²), metal, semi-permanent; two general storehouses, one, 11.1 m ² (120 ft ²), concrete block, permanent, one, 371.6 m ² (4000 ft ²), metal, temporary; Facilities Engineer storehouse, 193.1 m ² (2079 ft ²), metal, temporary; lumber and pipe storage shed 228.5 m ² (2460 ft ²), wood, temporary; four miscellaneous storage sheds; shallow water well (potable). | 143 | 975130/980129 | Telephone line: Range communications, government owned 3 pr-19 ga rural distribution wire. |
| 112 | 981171/013199 | Power line ¹ : Post distribution to Ranges 4 through 15. | 144 | 980129 | Range 32 (record fire): Control tower ¹⁷ ; target storehouse, 36.4 m ² (392 ft ²); two latrines ¹⁰ , three bleachers ¹⁸ . |
| 113 | 012195 | Range 14 (flame thrower):Control tower ¹⁶ ; block house, 5.9 m ² (64 ft ²), concrete, permanent; bleachers ¹⁸ . | 145 | 975130/980129 | Power line ¹ . |
| 114 | 014198 | Range 15 (rifle grenade, 89 mm rocket launcher, and M72 LAW): Training building, 301.0 m ² (3240 ft ²), metal, permanent; target storehouse ¹⁹ ; latrine ¹⁰ ; two bleachers ¹⁸ ; control tower ¹⁶ . | 146 | 978132 | Range 33 (moving target, heavy machine gun 0.50 caliber, M72 LAW, all purpose): Electrical equipment building, 3.0 m ² (32 ft ²), wood, temporary; latrine ¹⁰ ; two bleachers ¹⁸ ; control tower ¹⁶ ; moving target track length 400 m (1312 ft). |
| 115 | 995185/083245 | Cable, underground ⁹ . | 147 | 964153/975130 | Telephone line: Range communications, government owned, two aerial cables, one, 11 pr-19 ga rural distribution wire and one, 6 pr-19 ga rural distribution wire. |
| 116 | 018205 | Range 16 (M79 and M203 grenade launcher): Target storehouse ¹⁹ ; control tower ¹⁶ ; latrine ¹⁰ ; bleachers ¹⁸ . | 148 | 951160/982114 | Power line: Four no. 1/0 ACSR 12.5/7.2 KV aerial lines, owned by Virginia Electric Cooperative. |
| 117 | 025211 | Range 17 (caliber 0.50 machine gun): Target storehouse ¹⁹ ; control tower ¹⁶ ; two bleachers ¹⁸ ; latrine ¹⁰ ; firing berm, length 50.0 m (164 ft), width 11.0 m (36 ft). | 149 | 969139 | Old ammunition supply point: Eight storage buildings, five, 74.3 m ² (800 ft ²), two, 178.4 m ² (1920 ft ²), one, 89.2 m ² (960 ft ²), all metal, temporary; latrine, 17.8 m ² (192 ft ²), concrete block, permanent. |
| | | | 150 | 972143 | Range 34 (record fire): Control tower ¹⁷ ; target storehouse, 36.4 m ² (392 ft ²), wood, temporary; latrine ¹⁰ . |
| | | | 151 | 968144 | Range 36N(A) and (B) (target detection): Two bleachers ¹⁸ . |
| | | | 152 | 965153/972158 | Telephone line: Range communications, government owned, two 104 copperweld lines on 10 pin cross-arms. |
| | | | 153 | 959162/965153 | Telephone line: Range communications, government owned, aerial cable (except where buried under sod airstrip at 964153 grid reference), 18 pr-19 ga rural distribution wire. |
| | | | 154 | 987228 | Sanitary landfill: Main post landfill area, approximately 6.5 ha (16 acre). |
| | | | 155 | 992198 | Fuel point ²⁰ : Capacity 37,853 liters (10,000 gal). |
| | | | 156 | 957175 | Gas chamber: 47.6 m ² (512 ft ²), wood frame, temporary. |
| | | | 157 | 959160 | Fuel point ²⁰ : Capacity 51,290.8 liters (13,550 gal). |
| | | | 158 | 950182 | Fuel point ²⁰ : Capacity 37,853 liters (10,000 gal). |
| | | | 159 | 979285 | Sanitary landfill: Area approximately 2.0 ha (5 acre), used only during annual training periods. |
| | | | 160 | 979171 | Fuel point ²⁰ : Capacity 37,853 liters (10,000 gal). |
| | | | 161 | 974233 | Fuel point ²⁰ : Capacity 37,853 liters (10,000 gal). |
| | | | 162 | 001244 | Sanitary landfill: Scrap metal landfill area, approximately 2.8 ha (7 acre). |

1 Government owned post distribution, 2 No. 4 ACSR-7.2 KV aerial line.
2 Government owned post communications aerial cable, (12 pr-22 ga stalpeth).
3 Government owned post communications aerial cable, (18 pr-22 ga stalpeth).
4 Government owned post communications cable, underground direct burial, (12 pr-19 ga).
5 Government owned post communications aerial cable, (25 pr-19 ga figure 8).
6 Government owned post communications aerial cable, (12 pr-19 ga figure 8).
7 Government owned post communications aerial cable, (6 pr-19 ga rural distribution wire).
8 Government owned post primary distribution, 4 No. 4 ACSR-12.5/7.2 KV aerial line.

9 Government owned post communications cable, underground burial, (25 pr-19 ga).
10 Latrine, 10.0 m² (108 ft²), concrete block, semi-permanent.
11 Tent frames and floors, 49.1 m² (528 ft²), concrete slab.
12 Tent frames and floors, 49.1 m² (528 ft²), wood floor.
13 Mess tent slabs, 98.1 m² (1056 ft²), concrete, and kitchen tent slabs, 20.1 m² (216 ft²), concrete.
14 General purpose warehouse, 371.6 m² (4000 ft²), quonset, metal, wood frame temporary.

15 Motor repair shop, 89.2 m² (960 ft²), metal, semi-permanent.
16 Control tower, height varies 4.9 m (16 ft) or less; base generally 3.3 m² (36 ft²), wood, temporary.
17 Control tower, height varies 4.9 m (16 ft) or less; base generally 3.3 m² (36 ft²), wood, permanent.
18 Bleachers, 55 man capacity, all aluminum, portable.
19 Target storehouse, 14.9 m² (160 ft²), wood, temporary.
20 Underground fuel tanks, with dispensing pumps, steel and concrete, permanent.



FORT A.P. HILL, VIRGINIA TERRAIN ANALYSIS NON-URBAN CULTURE FEATURES

| | | | | | |
|--|-------------------------------------|--|-------------------|--|-------------------------------|
| | Building | | AIR CONTROL Tower | | Telephone Line |
| | Facilities Engineer Division | | Radio Tower | | Underground Cable (power) |
| | Campsite | | Rappelling Tower | | Underground Cable (telephone) |
| | Gas Chamber | | Scout Camp | | Pipeline (above ground) |
| | Training Site | | Trailer Camp | | Fence |
| | Wall | | Vehicle Wash Rack | | Sanitary Landfill |
| | Moving Target | | Fuel Point | | Sewage Treatment Plant |
| | Tower (Observation, Control, Guard) | | Power Line | | Oxidation Pond |

NOTE: Numbered symbol on map refers to entry in table.

III. OFF-POST FEATURES

Off-post features in this study are limited to airfields and urban areas within an 80.4 kilometer (50 mile) radius and ports within a 160.9 kilometer (100 mile) radius of Fort A. P. Hill. The locations of these features are shown on the accompanying map.

AIRFIELDS:
There is only one airfield within an 80.4 kilometer (50 mile) radius of Fort A. P. Hill that will support aircraft as large as the C-130 Hercules on a regular basis. This is the Richard Evelyn Byrd International Airport, approximately 9.7 kilometers (6 miles) east of Richmond and 64.4 kilometers (40 miles) from the army post. The Naval Air Station (NAS) at Patuxent River Maryland, 82.9 kilometers (51.5 miles) from the base will support the C-130 aircraft and is included in this study. NAS Patuxent River is a naval air test center, therefore prior permission is required for all transient aircraft to utilize the airfield and its facilities.

URBAN AREAS:
There are 17 urban areas with populations of 2500 or more within an 80.4 kilometer (50 mile) radius of Fort A. P. Hill, in the states of Virginia and Maryland. They range in size from 2500 for Dumfries, Virginia, Leonardtown, Maryland and Triangle, Virginia to 592,000 for the Richmond, Virginia, metropolitan area, the one major city in the study area.

The majority of urban areas listed, although officially-incorporated towns, are not of independant status and statistics on some of their facilities are combined with those of their parent counties. The accompanying tables present data in terms of population, housing, education, medical and recreation facilities, and public utilities. Where this data is county-wide it is so annotated.

PORTS:
Fort A. P. Hill is within 160.9 kilometers (100 miles) of 14 ports that will support ocean-going vessels; these ports are situated either at or near the entrance to Chesapeake Bay or on the several rivers that flow into the bay. Two of the largest port complexes on the east coast of the United States, Baltimore and Hampton Roads, are included.

The Port of Baltimore, Maryland is at the head of the navigable portion of the Patapsco River, approximately 19.3 kilometers (12 miles) northwest of the Chesapeake Bay and 273.6 kilometers (170 miles) north of the entrance from the Atlantic Ocean to the bay. There is also access to the port from the ocean via the sea level Chesapeake and Delaware Canal and the Delaware Bay, a distance of 209.2 kilometers (130 miles). The Port of Baltimore is approximately 170.6 kilometers (106 miles), by road, from Fort A. P. Hill.

The harbor area of Hampton Roads is formed by the confluence of three tidal rivers, the James, the Nausemond and the Elizabeth. It has an area of 64.7 square kilometers (25 square miles) and forms the approach to the deep-draft ports of Norfolk, Newport News, Portsmouth and Chesapeake. Two 13.7 meter (45 feet) channels extend through Hampton Roads. One channel of 29.0 kilometers (18 miles) extends southeast into Norfolk, Portsmouth and Chesapeake; these ports being approximately 225.3 kilometers, (140 miles) by road, from Fort A. P. Hill. The other channel of 7.7 kilometers (4.8 miles) extends westward to Newport News, approximately 188.3 kilometers (117 miles), by road, from Fort A. P. Hill. The accompanying tables present data on each of the Hampton Roads ports separately.

Naval facilities are included in the Norfolk and Portsmouth tables. Listed separately are the Naval Weapons Station at Yorktown, the Cheatham annex to the Naval Supply Center and the Yorktown fuel terminal on the York River, and also the Naval Amphibious Base, Little Creek. Facilities at these bases for transient movements would be very limited.

Road and rail communications are generally very good from all the ports under study. Rail spurs join most of the dock areas with main routes which connect with a line running 3.2 kilometers (2 miles) southwest of Fort A. P. Hill. Major highways provide good road clearance facilities.

Although each port has its own handling equipment, one 317.5 metric ton (350 short ton) capacity, sheer leg, barge-mounted floating crane with tug and operating crew, and owned by the Tidewater Construction Corporation, is available to all maritime interests in the Hampton Roads area.

A. AIRFIELDS

| NAME; LOCATION; TYPE; CLASSIFICATION | ELEVATION & STATUS | RUNWAY DESCRIPTION | TAXIWAY, PARKING APRON, & HARDSTAND AREA DESCRIPTION | BUILDING DESCRIPTION | POL FACILITIES, MAINTENANCE & SERVICES | NAVIGATIONAL AIDS | REMARKS |
|--|---|---|--|--|--|--|--|
| Richard Evelyn Byrd International 37° 30' N 77° 19' W Type: Airport Classification: Civil (Joint use facility with Virginia National Guard and Virginia Air National Guard as tenants) | Elevation : 50.9 m (167 ft) Status : Operational | Runway 15/33 Direction : 154°/334° (magnetic) Length : 2742.9 m (8999 ft) Width : 45.7 m (150 ft) Maximum weight bearing capacity S125, T260, ST175, TT340. ¹ Asphalt surface. Good condition. Runway 02/20 Direction : 020°/200° (magnetic) Length : 2013.8 m (6607 ft) Width : 45.7 m (150 ft) Maximum weight bearing capacity TT340 based on past usage. Asphalt surface. Good condition. Runway 06/24 Direction : 064°/244° (magnetic) Length : 1620.3 m (5316 ft) Width : 45.7 m (150 ft) Maximum weight bearing capacity T70 based on past usage. Concrete surface. Good condition. | Taxiways: Both parallel and link types, width 22.9 m (75 ft); maxi- mum weight bearing capac- ity TT340. Concrete surface in good condition. Parking Aprons: Seven, total area 129,762.7 m ² (1,396,800 ft ²), divided be- tween the main terminal, south terminal, Air and Army National Guard areas. Con- crete surfaces with maximum weight bearing capacity TT340. Aircraft on Air Nation- al Guard apron limited to AUW 45,360 kg (100,000 lb). | Hangars: Seven, total area 22,944.9 m ² (246,985 ft ²), including work- shop and maintenance bays. Of this total, the Air National Guard which is located on the northeast side of the airfield, occupies 2423.1 m ² (26,083 ft ²) and the Army National Guard which is located on the southeast side of the airfield, occupies 1783.7 m ² (19,200 ft ²). Main Terminal and Administration Buildings: Located on west side of airfield, with direct access to main parking apron, total area 8500.1 m ² (91,500 ft ²). | Fuel: Jet fuel, types TA and TA-1 in underground storage 302,804 liters (80,000 gal) capacity. JP-4 available at military ramps only. 100/130 octane aviation gasoline in underground storage 931,183 liters (246,000 gal) capacity. Fuel is stored at two locations in the main terminal area and one in the Air National Guard area. It is dispensed by tank truck. Hawthorne Aviation provides the contract fuel. Oil: Oil and lubricants are available for all engine categories. Maintenance and Services: Field and organizational main- tenance available. High pressure and low pressure oxygen. Jet starters and auxiliary power available. Cargo handling and snow removal equipment available. Logistics: Access road to primary highway. Railroad spur to main line. Communications: Point-to-point telephone, telegraph and teletype. | Navigational and Landing Aids: Radio navigation beacon (VORTAC) situated on the airfield and operated by the Federal Aviation Administra- tion. Full air traffic control and radar surveillance. Preci- sion Approach Radar (PAR) and Instrument Landing Sys- tem (ILS) available. Lighting: Civil airport rotating beacon and full approach, threshold, runway and taxiway lighting. Runway lighting is of high intensity on runways 06/24 and 15/33; medium intensity on runways 02/20. | Maximum arrival/departure rates for aircraft, that can normally be accepted, are 20 per hour under instrument weather conditions and 30 per hour in good weather. |
| Patuxent River Naval Air Station 38° 17' N 76° 25' W Type: Airfield Classification: Naval Air Station | Elevation : 11.6 m (38 ft) Status : Operational | Runway 06/24 Direction : 058°/238° (magnetic) Length : 3596.6 m (11,800 ft) Width : 91.4 m (300 ft) Maximum weight bearing capacity S126, T188, ST175, TT340 Concrete surface. Good condition. Runway 13/31 Direction : 135°/315° (magnetic) Length : 2956.6 m (9700 ft) Width : 61.0 m (200 ft) Maximum weight bearing capacity S147, T222, ST175, TT398 Asphalt surface. Good condition. NOTE: First 609.6 m (2000 ft) of runway 31 closed 0900-1730 EST Mon-Fri under Visual Flight Rules conditions. Runway 02/20 Direction : 015°/195° (magnetic) Length : 1950.7 m (6400 ft) Width : 91.4 m (300 ft) Maximum weight bearing capacity ST124 based on past usage. Concrete surface. Good condition. | Taxiways: Parallel and link types, width 30.5 m (100 ft), maximum weight bearing capacity TT398, based on past usage. Surface concrete in good con- dition. Parking Aprons: Five with 370,671 m ² (3,990,000 ft ²) total area. Concrete surface. Maximum weight bearing capacity TT398, based on past usage. | Hangars: Eight, total area 75,177.6 m ² (809,231 ft ²). Concrete floors with servicing and maintenance bays and offices attached, total area 13,312.57 m ² (143,300 ft ²). Operations, Administration and Terminal Buildings: Base operations, weather office and control tower in one build- ing complex, airfield and domes- tic fire stations, ordnance storage and marine facilities plus associ- ated operations and test build- ings. Station administration headquarters and equipment stores. Domestic Buildings: Six barrack blocks, mess halls, BOQ, married quarters, clubs, sick-bay, navy exchange, and inter-denominational church. | Fuel: Jet fuel types JP-4 and JP-5 in underground storage 11,355,900 liters (3,000,000 gal) capacity. Dispensing rate 374,744.7 liters (99,000 gal) per hour. 115/145 octane aviation gasoline in underground storage 757,060 liters (200,000 gal) capacity. Dispensing rate 124,914.9 liters (33,000 gal) per hour. Fuel dispensed and restored by tank trucks. Single point refueling available. Oil: Oil and lubricants available for all types of jet and piston aircraft. Maintenance and Services: Low and high pressure oxygen and also liquid oxygen available. Field and organizational maintenance. Jet starters and auxiliary power available. Logistics: Access road to primary highway. Routing to Fort A. P. Hill is via U. S. Highway 301 river bridge. There is a rail spur on base and a navigable waterway to Chesapeake Bay ports. Communications: Point-to-point telephone, telegraph, and teletype. | Navigational and Landing Aids: VORTAC situated on the airfield operated by the navy. Full air traffic control and radar surveillance. Precision approach PAR available. Lighting: Military airport rotating bea- con and approach, threshold, high intensity runway and taxiway lighting for runways 13/31 and 06/24. Touch- down zone lighting on 06. | This is a naval air test center and numerous test projects are normal- ly in progress. Prior permission is required for all transient military aircraft [telephone (301) 863- 3836]. Transient maintenance is available but fuel is limited. Customs, immigration and agricul- ture fumigation also available. Maximum arrival/departure rates for aircraft that can normally be accepted, are 10 per hour under instrument weather conditions and 15 per hour in good weather. |

¹ Runway weight bearing capacity in pounds (gross weight of aircraft) is determined by adding 000 to figure following S, T, ST, TT. Runway weight bearing capacity given is for unlimited operations. Aircraft weight higher than given requires prior permission from aerodrome controlling authority.
S- Runway weight bearing capacity for aircraft with single-wheel type landing gear (C-47,F100).
T- Runway weight bearing capacity for aircraft with twin-wheel type landing gear (C-9A).
ST- Runway weight bearing capacity for aircraft with single-tandem landing gear (C-130).
TT- Runway weight bearing capacity for aircraft with twin-tandem type (includes quadricycle) landing gear (B-52, C-135).

For further information, see DOD Flight Information Publication (enroute IFR-Supplement United States).

B. URBAN AREAS

| NAME AND LOCATION | POPULATION | HOUSING AVAILABILITY | EDUCATION FACILITIES | MEDICAL FACILITIES | RECREATION FACILITIES | PUBLIC UTILITIES | REMARKS |
|--|-----------------|----------------------|--|--|---|---|--|
| Ashland, VA (Hanover County) 37° 46' N 77° 28' W | 1970 census | : 2934 | Houses (Hanover County) Total units : 14,884 Renter-occupied : 2615 Average monthly rent : \$280 Vacancy rate : 2% New house starts : 557 Number of sales : 633 Average sale price : \$52,000 Apartments (Hanover County) Total units : 400 Average monthly rent : \$180 Vacancy rate : 3% (1977 data) | Ashland Public Schools Elementary Schools Number of schools : 3 Enrollment capacity : 1890 1977/78 Enrollment : 1890 1980 Projection : 1833 Junior High Schools Number of schools : 1 Enrollment capacity : 850 1977/78 Enrollment : 850 1980 Projection : 811 Secondary Schools Number of schools : 2 Enrollment capacity : 2800 1977/78 Enrollment : 2680 1980 Projection : 2830 Special education facilities are provided in normal schools. Private Schools Hanover Academy, grades 1-8, 200 enrollment. No plans for expansion. Several other institutions, located in Richmond, are available to Hanover County. Higher Education Randolph-Macon College, Ashland. Enrollment capacity : 938 1977/78 Enrollment : 938 1980 Projection (to remain the same) A liberal arts college which offers full degree courses in 18 major study fields. Richmond colleges and universities are available, situated approximately 25.7 km (16 mi) south of Ashland. | Doctors Total number : 7 Doctor/population ratio : 1/536 Dentists Total number : 5 Dentist/population ratio : 1/750 Hospitals Richmond hospitals are available, 25.7 km (16 mi) south of Ashland. Ashland Public Health Department operates a regular health clinic. (1978 data) | Hanover County parks : 6 Richmond facilities are available, 25.7 km (16 mi) south of Ashland. (1978 data) | Electric Power Source : VEPCO ¹ Type : Nuclear, coal and oil. Future plants : VEPCO development. Sewage Disposal Number of plants: 2 (1 municipal, 1 county). Type of treatment: Primary and secondary plus chlorination. Flow capacity PD ² : 3,452,193.6 liters (912,000 gal). Actual flow PD : 1,703,385.0 liters (450,000 gal). Heating Fuels Types available : Oil, electricity and coal by local delivery. Water Supply Source : South Anna River, through purification plant with capacity of 3.8 million liters (1 million gal) per day. Adequacy of service : Present consumption 1,362,708 liters (360,000 gal) per day. Storage : Ground storage tank: 1,892,650 liters (500,000 gal) Elevated tank: 378,530 liters (100,000 gal). Standpipe: 2,611,857 liters (690,000 gal) Clearwell: 306,609 liters (81,000 gal). (1978 data) |
| | 1977 | : 3750 | | | | | |
| | 1980 projection | : 4100 | | | | | |
| Colonial Beach, VA (Westmoreland County) 38° 15' N 76° 58' W | 1970 census | : 2058 | Houses Total units : 2800 (including summer homes) Renter-occupied : 100 Average monthly rent : \$125 Vacancy rate : 20% New house starts : 10 Number of sales : 30 Average sale price : \$30,000 Apartments Total units : 25 Average monthly rent : \$150 Vacancy rate : 20% (1977 data) | Colonial Beach Public School Elementary and high school combined Number of schools : 1 Enrollment capacity : 600 1977/78 Enrollment : 510 1980 Projection : 560 | Doctors Total number : 2 (Westmoreland County) : 5 Doctor/population ratio : 1/1255 Dentists Total number : 1 Dentist/population ratio: 1/2510 Hospitals and Nursing Homes None Nearest hospital 48.2 km (30 mi) at Fredericksburg. (1976 data) | Parks : 1 Athletic Fields : 1 (1978 data) | Electric Power Source : VEPCO Type : Nuclear and oil. Future plants : VEPCO development. Sewage Disposal Number of plants: 1 Type of treatment: Secondary. Flow capacity PD: 3,028,240 liters (800,000 gal) Actual flow PD : 1,135,590 liters (300,000 gal) Heating Fuels Types available : Oil. Service available : Local delivery. Water Supply Source : Wells, with chlorination treatment. Two ground reservoirs of capacity 1,135,590 liters (300,000 gal), plus storage tanks 946,325 liters (250,000 gal). Adequacy of service : Adequate through 1980's. (1978 data) |
| | 1977 | : 2510 | | | | | |
| | 1980 projection | : 3000 | | | | | |
| Culpeper, VA (Culpeper County) 38° 29' N 78° 00' W | 1970 census | : 6056 | Houses (Culpeper County) Total units : 7942 Renter-occupied : 1808 Average monthly rent : \$200 Vacancy rate : 1% New house starts : 400 Number of sales : 790 Average sale price : \$55,000 Apartments (Culpeper County) Total units : 463 Average monthly rent : \$200 Vacancy rate : 1% (1977 data) | Culpeper Public Schools Elementary Schools Number of schools : 6 Enrollment capacity : 2588 1977/78 Enrollment : 2588 1980 Projection : 2788 There are no junior high or secondary schools in Culpeper. The following schools are located in Culpeper County. Junior High Schools Number of schools : 1 Enrollment capacity : 1500 1977/78 Enrollment : 1360 1980 Projection : 1560 Secondary Schools Number of schools : 1 Enrollment capacity : 1200 1977/78 Enrollment : 1177 1980 Projection : 1377 Vocational Schools Piedmont Vocational School in Culpeper serves three-county area. Higher Education Germanna Community College 25.7 km (16 mi) and Mary Washington College 56.3 km (35 mi) east of Culpeper. (See Fredericksburg information). | Doctors Total number : 22 Doctor/population ratio : 1/322 Dentists Total number : 7 Dentist/population ratio : 1/1011 Hospitals Total number : 1 Total beds : 106 Intensive and coronary care unit of four beds (1976 data) | Parks : 1 Athletic Fields : 6 Tennis Facilities : 4 Golf Courses : 2 (1978 data) | Electric Power Source : VEPCO, through town of Culpeper and Northern Piedmont Power Company as distributors. Type : 50% nuclear, 25% oil, 25% coal. Future plants : VEPCO development. Sewage Disposal Number of plants: 1 Type of treatment: Primary and secondary with chlorination Flow capacity PD: 5.7 million liters (1.5 million gal) Actual flow PD : 4.9 million liters (1.3 million gal) Plant enlarged and renovated in 1966-7 for a new design population of 10,000. Further upgrading and expansion of treatment system is planned. Heating Fuels Types available : Gas (pipe and bottled), oil and coal. Service available : Local delivery. Gas pipelines of Atlantic Seaboard Corporation and Transcontinental Gas Pipeline Corporation cross north and east sections of county. Water Supply Source : Mountain Run Reservoir with storage capacity of 617 million liters (163 million gal) plus flood water retention capability. Capacity PD : Fluoridation and chlorination plant capacity of 7.6 million liters (2 million gal). Three storage reservoirs of 5.7 million liters (1.5 million gal). Consumption PD : 4.9 million liters (1.3 million gal). Additional water sources in the county from private wells which are untreated. (1977 data) |
| | 1977 | : 7076 | | | | | |
| | 1980 projection | : 7490 | | | | | |

B. URBAN AREAS (Continued)

| NAME AND LOCATION | POPULATION | HOUSING AVAILABILITY | EDUCATION FACILITIES | MEDICAL FACILITIES | RECREATION FACILITIES | PUBLIC UTILITIES | REMARKS |
|---|---|---|---|---|--|---|--------------------------------------|
| Dale City, VA (Prince William County) 38° 41' N 77° 20' W | 1970 census : 13,857 1977 : 30,000 1980 projection : 33,700 | Houses (Prince William County, excluding the Manassas cities) Total units : 31,466 Renter-occupied : 6490 Average monthly rent : \$207 Vacancy rate : 4% New house starts : 1851 Number of sales : 2250 Average sale price : \$52,200 Apartments (Prince William County, excluding the Manassas cities) Total units : 4772 Average monthly rent : \$207 Vacancy rate : 4.6% (1977 data) | Dale City Public Schools Elementary Schools Number of schools : 5 Enrollment capacity : 3975 1977/78 Enrollment : 4071 1980 Projection : 4445 (a sixth elementary school is under construction.) Junior High Schools Number of schools : 2 Enrollment capacity : 2315 1977/78 Enrollment : 2149 1980 Projection : 2346 Secondary Schools Number of schools : 1 Enrollment capacity : 2875 1977/78 Enrollment : 3255 1980 Projection (under review) This secondary school currently serves the towns of Triangle and Dumfries as well as Dale City. An additional high school (Potomac High School) is under construction. Special Education and Vocational Schools As for Manassas Private Schools As for Manassas Higher Education See Woodbridge Northern Virginia Community College (Woodbridge campus), is at 3.2 km (2 mi). George Mason University in Fairfax County, which offers a full four year curriculum, is within commuting distance. Several colleges and universities within the Washington D. C. area are also available. | Prince William County Doctors (excluding the Manassas cities) Total number : 60 Doctor/county population ratio : 1/2403 Prince William County Dentists (excluding the Manassas cities) Total number : 33 Dentist/county population ratio : 1/4370 Hospitals Total number : 1 [Potomac Hospital Woodbridge, at 3.2 km (2 mi)] Total beds : 250 Intensive care unit of five beds Coronary care unit of four beds Prince William Hospital, Manassas, 154 beds, is at 20.9 km (13 mi) U. S. Naval Hospital Quantico, 75 beds, is at 16.1 km (10 mi) Nursing Homes Total number : 1 [Woodbridge Nursing Center, at 3.2 km (2 mi)] Total beds : 120 (1976 data) | Parks : 5 Athletic Fields : 4 Tennis Facilities : 18 (1978 data) | Electric Power Source : The Prince William Electric Cooperative and VEPCO. Type : Nuclear, coal and oil. Future plants : VEPCO development. Sewage Disposal Number of plants : 1 Type of treatment: Secondary with chlorination. Flow capacity PD: 22.7 million liters (6 million gal) Actual flow PD : 11.4 million liters (3 million gal) Heating Fuels Types available : Oil and natural gas. Service available : Washington Gas Light Company and Columbia Gas of Virginia. Transcontinental Gas Pipeline Corporation maintains county transmission lines. Oil on local delivery. Water Supply Source : Dale City Sanitary District and Virginia America Water Company. Supply obtained from Fairfax County Water Authority, supplemented by local wells. Adequacy of service : Adequate for foreseeable future. (1978 data) | Dale City is an unincorporated town. |
| Dumfries, VA (Prince William County) 38° 34' N 77° 20' W | 1970 census : 1890 1977 : 2500 1980 projection : 3990 | Houses and apartments (Prince William County, excluding the Manassas cities) As for Dale City. | Dumfries Public Schools Elementary Schools Number of schools : 1 Enrollment capacity : 630 1977/78 Enrollment : 616 1980 Projection : 680 Junior High Schools Number of schools : 1 Enrollment capacity : 1145 1977/78 Enrollment : 839 1980 Projection : 870 Secondary Schools See Dale City Students presently attend Dale City High School. New high school under construction. Special Education and Vocational Schools As for Manassas Private Schools As for Manassas Higher Education As for Woodbridge Northern Virginia Community College (Woodbridge campus) is at 12 km (7.5 mi). | Doctors Total number : 10 Doctor/population ratio : 1/250 Prince William County Dentists (excluding the Manassas cities) Total number : 33 Dentist/county population ratio : 1/4370 Hospitals Potomac Hospital Woodbridge, 250 beds, 12.1 km (7.5 mi) U. S. Naval Hospital Quantico, 75 beds, 6.4 km (4 mi) Manassas Hospital, 154 beds, 29.0 km (18 mi) (1976 data) | Prince William County facilities Parks : 31 These include Federal Park Prince William Forest Park, 4973.6 ha (12,290 acre) and Locuste Shade County Park, 316.7 ha (782.7 acre), which are adjacent to Dumfries. Athletic Fields : 61 Tennis Facilities : 25 Golf Courses : 1 (1978 data) | Electric Power Source : Prince William Electric Cooperative and VEPCO. Type : Nuclear, coal and oil. Future plants : VEPCO development. Sewage Disposal As for Woodbridge. Heating Fuels As for Woodbridge. Water Supply Source : Fairfax County Water Authority and the Occoquan Reservoir. Storage capacity 8.3 million liters (2.2 million gal) supplemented by private and state owned wells. Adequacy of service : Adequate. No plans for early expansion. (1978 data) | |
| Falmouth, VA (Stafford County) 38° 20' N 77° 27' W | 1970 census : 2139 1977 : 2770 1980 projection : 3038 | Houses (Stafford County) Total units : 10,788 Renter-occupied : 535 Average monthly rent : \$280 Vacancy rate : 1% New house starts : 1018 Number of sales : 1900 Average sale price : \$45,000 Apartments (Stafford County) Total units : 539 Average monthly rent : \$200 Vacancy rate : 1% (1977 data) | Falmouth Public Schools Elementary Schools Number of schools : 1 Enrollment capacity : 775 1977/78 Enrollment : 764 1980 Projection : 800 Junior High Schools Number of schools : 2 Enrollment capacity : 1799 1977/78 Enrollment : 1799 1980 Projection : 1850 There are no secondary schools in Falmouth. The following school is located in Stafford County. Enrollment capacity : 2100 1977/78 Enrollment : 2800 1980 Projection : 2900 (Second high school planned for 1981.) Higher Education As for Fredericksburg | There are no doctors or dentists in Falmouth. Stafford County Doctors Total number : 1 (excluding Fredericksburg) Doctor/county population ratio : 1/31,230 Stafford County Dentists Total number : 3 (excluding Frdericksburg) Dentist/county population ratio : 1/10,410 Stafford County Hospitals Fredericksburg hospital, 286 beds 3.2 km (2 mi) serves the area. Stafford County Nursing Home Total number : 1 Total beds : 34 (1976 data) | Fredericksburg recreation facilities are available to Falmouth. | Electric Power As for Fredericksburg. Sewage Disposal Number of plants : 1 Type of treatment: Primary and secondary with chlorination. Flow capacity PD: 5.68 million liters (1.5 million gal) Actual flow PD : 2.84 million liters (0.75 million gal) Development planned : To be part of regionalized plant area by 1982, as for Fredericksburg. Heating Fuels As for Fredericksburg. Water Supply Source : As for Fredericksburg. Adequacy of service : New filtration plant to be constructed on Potomac Creek. (1978 data) | |

B. URBAN AREAS (Continued)

| NAME AND LOCATION | POPULATION | HOUSING AVAILABILITY | EDUCATION FACILITIES | MEDICAL FACILITIES | RECREATION FACILITIES | PUBLIC UTILITIES | REMARKS |
|--|--|--|---|---|---|---|---|
| Fredericksburg, VA 38° 18' N 77° 28' W | 1970 census : 14,450 1977 : 18,099 1980 projection : 19,600 | Houses Total units : 6950 Renter-occupied : 580 Average monthly rent : \$300 Vacancy rate : 1% New house starts : 34 Number of sales : 180 Average sale price : \$49,000 Apartments Total units : 1300 Average monthly rent : \$215 Vacancy rate : 1% (1977 data) | Fredericksburg Public Schools Elementary Schools Number of schools : 2 Enrollment capacity : 1600 1977/78 Enrollment : 1455 1980 Projection : 1455 Junior High Schools Number of schools : 1 Enrollment capacity : 450 1977/78 Enrollment : 442 1980 Projection : 442 Secondary Schools Number of schools : 1 Enrollment capacity : 810 1977/78 Enrollment : 810 1980 Projection : 810 There are no special education or vocational training schools. Vocational courses are available in high school and there is an industrial cooperative training program. Practical nursing courses are available at the Mary Washington Hospital. Higher Education Mary Washington College Enrollment capacity : 2300 1977/78 Enrollment : 2300 1980 Projection : 2300 Four year degree courses in various arts, sciences and technical fields. Germanna Community College Enrollment capacity : 1500 1977/78 Enrollment : 1100 1980 Projection : 1000 Two year associate degree courses which are transferable. College is situated 27.4 km (17 mi) west of Fredericksburg. | Doctors Total number : 75 Doctor/population ratio : 1/241 Dentists Total number : 20 Dentist/population ratio : 1/905 Hospitals Total number : 1 Total beds : 286 Intensive care unit of 13 beds Nursing and Convalescent Homes Total number : 6 Total beds : 155 Fredericksburg Area Mental Hygiene Clinic provides psychiatric treatment. (1976 data) | Parks : 11 Athletic Fields : 13 Tennis Facilities : 10 Golf Courses : 1 (1978 data) | Electric Power Source : VEPCO Type : Primary nuclear (North Anna Unit 1) with secondary oil and coal. Future plants : VEPCO development. Sewage Disposal Number of plants: 2, (1 private, 1 municipal) Type of treatment: Primary and secondary with chlorination and separate sludge digestion. Flow capacity PD: 15.1 million liters (4.0 million gal) Actual flow PD : 13.3 million liters (3.5 million gal) Development planned : New 37.8 million liters (10 million gal) per day plant under construction in Spotylvania County to serve the whole region by 1982. Heating Fuels Types available : Oil, coal and natural gas. Service available : Local delivery. Gas by pipeline. Development planned : Natural gas pipelines being restructured by Commonwealth Gas Distribution Corporation. Water Supply Source : Rappahannock River through coagulation, filtration, chlorination and fluoridation. Capacity PD : 16.3 million liters (4.3 million gal) Consumption PD : 11.4 million liters (3.0 million gal) (1978 data) | |
| Leonardtown, MD (St. Mary's County) 38° 17' N 76° 38' W | 1970 census : 1406 1975 : 2500 1980 projection : 3600 | Houses (St. Mary's County) Total units (1970) : 13,705 Renter-occupied (1970): 5098 Average monthly rent : \$300 Vacancy rate : 5% New house starts : 615 Number of sales : 271 Average sale price : \$63,500 Apartments (St. Mary's County) Total units (1970) : 1578 Average monthly rent : \$250 Vacancy rate : < 1% (1978 data, unless otherwise annotated.) | Leonardtown Public Schools Elementary Schools Number of schools : 1 Enrollment capacity : 500 1978/79 Enrollment : 450 1980 Projection : 465 Junior High Schools Number of schools : 1 Enrollment capacity : 900 1978/79 Enrollment : 850 1980 Projection : 877 Secondary Schools Number of schools : 1 Enrollment capacity : 1450 1978/79 Enrollment : 1450 1980 Projection : 1495 St. Mary's County Vocational Schools County Technical Center in Leonardtown provides courses on range of vocational/technical subjects. St. Mary's County Private Schools Number of schools : 15 1978 Enrollment : 2660 | Doctors Total number : 20 Doctor/population ratio : 1/125 Dentists Total number : 5 Dentist/population ratio : 1/500 Hospitals Total number : 1 Total beds : 82 Nursing Homes Total number : 1 Total beds : 66 (1978 data) | Recreation facilities as for Lexington Park. | Electric Power Source : Southern Maryland Electric Cooperative and Potomac Electric Power Company. Type : Oil and coal. Future plants : Additional capacity is at planning stage for 1980. Sewage Disposal Number of plants: 1 Type of treatment: Primary with chlorination. Flow capacity PD: 1,135,590 liters (300,000 gal) Actual flow PD : 946,325 liters (250,000 gal) A facility plan study proposes doubling capacity by 1981. Heating Fuels Types available : Oil and coal. Service available : Local delivery. Water Supply Source : St. Mary's Metropolitan Commission. Two wells of total capacity 3217.5 liters (850 gal) per minute. Elevated storage in two tanks, total capacity 1,514,120 liters (400,000 gal) Adequacy of service : Adequate and no immediate plans for expansion. (1978 data) | |
| Lexington Park, MD (St. Mary's County) 38° 16' N 76° 27' W | 1970 census : 17,212 1975 : 21,500 1980 projection : 26,980 Population figures include the Naval Air Station, Patuxent River, 6500 personnel. | Houses and apartments (St. Mary's County) As for Leonardtown. | Lexington Park Public Schools Elementary Schools Number of schools : 4 Enrollment capacity : 1300 1978/79 Enrollment : 1087 1980 Projection : 1107 Junior High Schools Number of schools : 2 Enrollment capacity : 1750 1978/79 Enrollment : 1376 1980 Projection : 1276 Secondary Schools Number of schools : 1 Enrollment capacity : 1350 1978/79 Enrollment : 1435 1980 Projection : 1335 These enrollments include naval dependants, as there is no schooling on the naval air station. St. Mary's County Vocational and Private Schools As for Leonardtown. Higher Education St. Mary's College of Maryland, St. Mary's City, is 11.3 km (7 mi) south. Current enrollment 1100. Four year courses available. | Doctors Total number : 12 Doctor/population ratio : 1/1792 Dentists Total number : 10 Dentist/population ratio : 1/2150 Hospitals Leonardtown, 82 beds, at 22.5 km (14 mi). Nursing Homes Leonardtown, 66 beds, at 22.5 km (14 mi). (1978 data) | Parks : 5 Athletic Fields : 3 Tennis Facilities : 4 Golf Courses : 1 (1978 data) | Electric Power Source : Southern Maryland Electric Cooperative and Potomac Electric Power Company. Type : Oil and coal. Future plants : Additional capacity is at planning stage for 1980. Sewage Disposal Number of plants: 1 Type of treatment: Primary and secondary Flow capacity PD: 11.4 million liters (3 million gal) [Navy entitlement 5.7 million liters (1.5 million gal)] Actual flow PD : 6.4 million liters (1.7 million gal) [Navy 2.3 million liters (0.6 million gal)] Heating Fuels Types available : Oil and coal. Service available : Local delivery. Water Supply Source : St. Mary's Metropolitan Commission. Five wells of total flow capacity 5678 liters (1500 gal) per minute. Elevated storage 378,530 liters (100,000 gal). Stand pipe 4.9 million liters (1.3 million gal). Adequacy of service : Requires expansion. Expansion plans : An additional well to be drilled in 1979 with flow capacity of 757.1 liters (200 gal) per minute. (1978 data) | Lexington Park is an unincorporated town. |

B. URBAN AREAS (Continued)

| NAME AND LOCATION | POPULATION | HOUSING AVAILABILITY | EDUCATION FACILITIES | MEDICAL FACILITIES | RECREATION FACILITIES | PUBLIC UTILITIES | REMARKS |
|--|--------------------------|--|---|---|------------------------|---|---------|
| Manassas, VA 38° 45' N 77° 28' W | 1970 census : 9164 | Houses | Manassas Public Schools | Doctors | Parks : 3 | Electric Power | |
| | 1977 : 14,500 | Total units : 4172 | Elementary Schools | Total number : 50 | Athletic Fields : 10 | Source : Manassas municipal distribu- | |
| | 1980 projection : 16,500 | Renter-occupied : 876 | Number of schools : 2 | Doctor/population ratio : 1/498 | Tennis Facilities : 10 | tion from VEPCO and Prince | |
| | | Average monthly rent : \$207 | Enrollment capacity : 1600 | (Manassas and Manassas Park) | (1978 data) | William Electric Cooperative. | |
| | | Vacancy rate : < 1% | 1977/78 Enrollment : 1660 | Dentists | | Type : Nuclear, coal and oil. | |
| | | New house starts : 383 | 1980 Projection : 1941 | Total number : 11 | | Future plants : VEPCO development. | |
| | | Number of sales : 368 | (A third elementary school is due to be completed by September 1979.) | Dentist/population ratio : 1/2263 | | Sewage Disposal | |
| | | Average sale price : \$52,200 | Junior High Schools | (Manassas and Manassas Park) | | Number of plants : One regional facility, the | |
| | | Apartment | Number of schools : 1 | Hospitals | | Upper Occoquan Regional | |
| | | Total units : 650 | Enrollment capacity : 816 | Total number : 1 | | Treatment Plant. | |
| Manassas Park, VA 38° 47' N 77° 27' W | 1970 census : 6844 | Average monthly rent : \$207 | 1977/78 Enrollment : 435 | (Prince William Hospital) | | Type of treatment: Secondary, with chlorination | |
| | 1977 : 8000 | Vacancy rate : < 1% | 1980 Projection : 498 | Total beds : 154 | | and aerated pond. | |
| | 1980 projection : 8400 | (1977 data) | Secondary Schools | Intensive care unit of 11 beds | | Flow capacity PD : 41.3 million liters (10.9 mil- | |
| | | | Number of schools : 1 | There is planned expansion of this hospital to 244 beds. | | lion gal). | |
| | | | Enrollment capacity : 816 | Potomac Hospital Woodbridge, | | Actual flow PD : 24.6 million liters (6.5 mil- | |
| | | | 1977/78 Enrollment : 742 | 250 beds, is at 24.1 km (15 mi) | | lion gal). | |
| | | | 1980 Projection : 867 | U. S. Naval Hospital Quantico, 75 beds, is at 32.2 km (20 mi) | | Heating Fuels | |
| | | | Special Education Schools | | | Types available : Oil and natural gas. | |
| | | | (For mentally and physically handi- | Nursing Homes | | Service available : Washington Gas Light Com- | |
| | | | capped) | Total number : 1 | | pany and Columbia Gas of | |
| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | Number of schools (Prince William County): 3 | Vocational Schools | Total beds : 245 | | Water Supply | |
| | 1977 : 2800 | | Trade and industrial education pro- | A county health clinic and mental | | Source | |
| | 1980 projection : 3004 | | grams at four county high schools. | health clinic operate in Manassas. | | | |
| | | | Practical nursing courses at Prince | NOTE: The above data apply to | | | |
| | | | William Hospital. | the greater Manassas area, includ- | | | |
| | | | Private Schools | ing Manassas Park. | | | |
| | | | Two elementary schools accredited | (1976 data) | | | |
| | | | by State Board of Education, in | | | | |
| | | | Prince William County. | | | | |
| | | | Higher Education | | | | |
| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | Northern Virginia Community College | | | | | |
| | 1977 : 2800 | (Manassas campus) | | | | | |
| | 1980 projection : 3004 | Enrollment capacity : 2453 | | | | | |
| | | 1977/78 Enrollment : 2453 | | | | | |
| | | 1985 Projection : 5000 | | | | | |
| | | Expansion program is in progress. | | | | | |
| | | College provides two year courses | | | | | |
| | | that can be transferred. | | | | | |
| | | George Mason University, in Fair- | | | | | |
| | | fax County, which offers a full four | | | | | |
| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | year curriculum, is within commut- | | | | | |
| | 1977 : 2800 | ing range and several universities | | | | | |
| | 1980 projection : 3004 | and colleges within the Washington | | | | | |
| | | D. C. area are also available. | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
| | 1977 : 2800 | | | | | | |
| | 1980 projection : 3004 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
| | 1977 : 2800 | | | | | | |
| | 1980 projection : 3004 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
| | 1977 : 2800 | | | | | | |
| | 1980 projection : 3004 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
| | 1977 : 2800 | | | | | | |
| | 1980 projection : 3004 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
| | 1977 : 2800 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
| | 1977 : 2800 | | | | | | |
| | 1980 projection : 3004 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
| | 1977 : 2800 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |
| | 1977 : 2800 | | | | | | |
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| Orange, VA (Orange County) 38° 15' N 78° 06' W | 1970 census : 2768 | | | | | | |

B. URBAN AREAS (Continued)

| NAME AND LOCATION | POPULATION | HOUSING AVAILABILITY | EDUCATION FACILITIES | MEDICAL FACILITIES | RECREATION FACILITIES | PUBLIC UTILITIES | REMARKS |
|--|---------------------------|--|--|--|--|--|--|
| Richmond, VA 37° 33' N 77° 27' W | 1970 census : 249,431 | Houses | Richmond and Metropolitan Area Public Schools | Doctors | Parks : 44 | Electric Power | * Refers to city plus the metropolitan area, which includes most of the Henrico and Chesterfield Counties. |
| | : 518,319 * | Total units : 51,580 | | Total number : 835 | Athletic Fields : 243 | Source : VEPCO | |
| | 1977 : 219,677 | Renter-occupied : 17,279 | Elementary Schools | Doctor/population ratio : 1/263 | Tennis Facilities : 104 | Type : Coal and oil (75%), nuclear (22%), hydro (2%), combustion turbine (1%). | |
| | 1980 projection : 208,400 | Average monthly rent : \$275 * | Number of schools : 33 | Dentists | There are no public golf courses. | Future plants : VEPCO expansion. | |
| | : 603,899 * | Vacancy rate : 1.7% * | Enrollment capacity : 21,375 | Total number : 240 | (1978 data) | | |
| | | New house starts : 148 | 1977/78 Enrollment : 16709 | Dentist/population ratio : 1/915 | | | |
| | | Number of sales : 1516 * | 1980 Projection : 14,456 | Hospitals | | Seware Disposal | |
| | | Average sale price : \$41,250 | 75,000 * | Total number : 16 | | Number of plants : 10. Main city owned plant designed for 350,000 population. | |
| | | | Junior High Schools | Total beds : 19 * | | Type of treatment: Primary, secondary, some with chlorination and stabilization ponds. | |
| | | | Number of schools : 11 | Intensive care units : 8 | | Flow capacity PD: 265 million liters (70 million gal) | |
| | | Apartments | Enrollment capacity : 10,150 | Beds : 62 | | Actual flow PD : 208 to 227 million liters (55 to 60 million gal) | VEPCO provides most of the electric power to the whole study area, including Richmond, either directly or through wholesale distributing companies. Consumption, which reached a peak of 7902 megawatts in 1977 is expected to increase at an annual rate of 5.3% through 1987. Increase in VEPCO generating capacity is planned, to meet the demand, by means of additional nuclear and pumped storage units. |
| | | Total units : 39,756 | 1977/78 Enrollment : 8699 | Intensive care units : 11 * | | No plan for further expansion until new facilities in adjoining counties have been finalized. | |
| | | Average monthly rent : \$225 | 1980 Projection : 6924 | Beds : 84 * | | Heating Fuels | |
| | | Vacancy rate : 3.6% * | 21,730 * | Coronary care units : 5 | | Types available : Natural gas (at capacity), oil, coal. | |
| | | (1977 data) | Secondary Schools | Beds : 35 | | Service available : Home delivery, gas by pipeline. | |
| | | | Number of schools : 8 | Coronary care units : 7 * | | | |
| | | | Enrollment capacity : 10,227 | Beds : 46 * | | | |
| | | | 1977/78 Enrollment : 9214 | (Five hospitals have psychiatric facilities.) | | | |
| | | | 1980 Projection : 23,026 * | Nursing Homes | | | |
| | | | 23,486 * | Total number : 16 | | | |
| | | | Chesterfield County has three new schools, (one in each division), total capacity 2500, opening in September 1979. Henrico County has new high school opening in 1980. | Total beds : 2766 | | Water Supply | Water system supplies 70% of Henrico County population as well as Richmond. (1978 data) |
| | | | Special Education Schools | (1976 data) | | Source : City and counties water plants from wells and James River. Water is filtered, chlorinated and fluoridated. | |
| | | | Number of schools : 9 | | | Adequacy of service : Normally adequate. | |
| | | | Enrollment capacity : 650 | | | Capacity PD : 249.8 million liters (66 million gal) | |
| | | | 1977/78 Enrollment : 629 | | | Consumption PD : 140 to 265 million liters (37 to 70 million gal) | |
| | | | 1980 Projection : 647 | | | Expansion plans : Filtration plant is currently being updated to flow of 397.5 million liters (105 million gal) per day. | |
| | | | Vocational Schools | | | | |
| | | | Number of schools : 3 | | | | |
| | | | Enrollment capacity : 250 | | | | |
| | | | 1977/78 Enrollment : 184 | | | | |
| | | | 1980 Projection : 233 | | | | |
| | | | Over 1000 special education pupils are housed in regular schools. Approximately 50 vocational pupils are housed in regular schools. | | | | |
| | | | Private Schools | | | | |
| | | | There are 25 private schools in Richmond, five of which are accredited by the State Department of Education. | | | | |
| | | | Higher Education | | | | |
| | | | Virginia Commonwealth University and Medical College of Virginia | | | | |
| | | | Enrollment capacity : 19,200 | | | | |
| | | | 1977/78 Enrollment : 19,200 | | | | |
| | | | 1980 Projection : 19,300 | | | | |
| | | | Full curriculum | | | | |
| | | | University of Richmond | | | | |
| | | | Enrollment capacity : 4220 | | | | |
| | | | 1977/78 Enrollment : 4220 | | | | |
| | | | 1980 Projection : 4220 | | | | |
| | | | A church related school, including a law school. | | | | |
| | | | Virginia Union University | | | | |
| | | | Enrollment capacity : 1500 | | | | |
| | | | 1977/78 Enrollment : 1440 | | | | |
| | | | (on campus) : 1140 | | | | |
| | | | 1980 Projection : 1500 | | | | |
| | | | J. Sargeant Reynolds College | | | | |
| | | | Enrollment capacity : 8750 | | | | |
| | | | (plus new facility for 2500 ready late 1978) | | | | |
| | | | 1977/78 Enrollment : 8750 | | | | |
| | | | 1980 Projection : 11,000 | | | | |
| | | | Two year college offering vocational and college transfer programs with associate degrees. | | | | |
| | | | Richmond Technical Center | | | | |
| | | | Adult courses in more than 25 occupational fields as well as providing most of vocational programs at high school level. | | | | |
| | | | Five business colleges. | | | | |
| | | | | | | | |
| Triangle, VA (Prince William County) 38° 33' N 77° 20' W | 1970 census : 3021 | Houses and apartments (Prince William County, excluding the Manassas cities) | Triangle Public Schools | Doctors | Prince William County and Triangle facilities. | Public utilities as for Dumfries. | |
| | 1977 : 2500 | As for Dale City. | Elementary Schools | Total number : 1 | As for Dumfries | | |
| | 1980 projection : 2580 | | Number of schools : 1 | Doctor/population ratio : 1/2500 | | | |
| | | | Enrollment capacity : 565 | | | | |
| | | | 1977/78 Enrollment : 616 | Prince William County Dentists (excluding the Manassas cities) | | | |
| | | | 1980 Projection : 620 | Total number : 33 | | | |
| | | | Junior High Schools | Dentist/county population ratio : 1/4370 | | | |
| | | | Number of schools : 1 | Hospitals | | | |
| | | | Enrollment capacity : 1145 | Potomac Hospital Woodbridge, 250 beds, 14.5 km (9 mi) | | | |
| | | | 1977/78 Enrollment : 839 | U. S. Naval Hospital Quantico, 75 beds, 4.8 km (3 mi) | | | |
| | | | 1980 Projection : 870 | Manassas Hospital, 154 beds, 33.8 km (21 mi) | | | |
| | | | (This middle school is located at Dumfries.) | (1976 data) | | | |
| | | | Secondary Schools | | | | |
| | | | See Dale City | | | | |
| | | | Students presently attend Dale City High School. New high school under construction. | | | | |
| | | | Special Education and Vocational Schools | | | | |
| | | | As for Manassas | | | | |
| | | | Private Schools | | | | |
| | | | As for Manassas | | | | |
| | | | Higher Education | | | | |
| | | | As for Woodbridge | | | | |
| | | | Northern Virginia Community College (Woodbridge campus) is at 14.5 km (9 mi). | | | | |
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B. URBAN AREAS (Continued)

| NAME AND LOCATION | POPULATION | HOUSING AVAILABILITY | EDUCATION FACILITIES | MEDICAL FACILITIES | RECREATION FACILITIES | PUBLIC UTILITIES | REMARKS |
|--|--------------------------|--|---|---|--|--|---|
| Waldorf, MD (Charles County) 38° 37' N 76° 54' W | 1970 census : 12,607 | Houses (Charles County) | Charles County Public Schools | Doctors | Parks (state) : 5 | Electric Power | Waldorf is an unincorporated town. |
| | 1975 : 15,477 | Total units : 7979 | Elementary Schools | Total number : 26 | (county) : 2 | Source : Southern Maryland Electric Cooperative and Potomac Electric Power Company. | |
| | 1980 projection : 19,750 | Renter-occupied : 948 | Number of schools : 17 | Doctor/population ratio : 1/595 | (municipal) : 1 | Type : Oil and coal. | |
| | | Average monthly rent : \$300 | Enrollment capacity : 7554 | Dentists | Athletic Fields and Tennis Facilities : 15 | Future plants : None planned at this time. | |
| | | Vacancy rate : < 1% | 1978/79 Enrollment : 7556 | Total number : 26 | Golf Courses : 1 | | |
| | | New house starts : 821 | 1980 Projection : 7150 | Dentist/population ratio : 1/595 | (1978 data) | | |
| | | Number of sales : 263 | Junior High Schools | Hospitals | | Sewage Disposal | |
| | | Average sale price : \$69,500 | Number of schools : 6 | Total number : 1 | | Number of plants : 2 lagoons | |
| | | | Enrollment capacity : 5140 | Memorial Hospital La Plata, at 16.1 km (10 mi) | | Type of treatment: Primary and secondary with chlorination. | |
| | | | 1978/79 Enrollment : 4499 | Total beds : 108 | | Flow capacity PD : 4.5 million liters (1.2 million gal) | |
| | | Apartment (Charles County) | 1980 Projection : 4460 | Nursing Homes | | Actual flow PD : 3.8 million liters (1 million gal) | New regional advanced waste treatment plant due for completion 1979. Capacity 18.9 million liters (5 million gal) per day. |
| | | Total units : 347 | Secondary Schools | Total number : 1 | | | |
| | | Average monthly rent : \$250 | Number of schools : 4 | Total number : 1 | | | |
| | | Vacancy rate : <1% | Enrollment capacity : 5208 | La Plata, at 16.1 km (10 mi) | | | |
| | | (1978 data) | 1978/79 Enrollment : 5814 | Total beds : 121 | | | |
| | | | 1980 Projection : 5928 | (1978 data) | | | |
| | | | Eight temporary portable buildings, with total capacity of 800, supplement secondary school capacity. Special education facilities are included in regular schools. | | | | |
| | | | Charles County Vocational Schools. Vocational/technical center in Waldorf has enrollment of 555. | | | Heating Fuels | |
| | | | Charles County Private Schools | | | Types available : Gas, oil, and coal. | |
| | | | Number of schools : 10 | | | Service available : Gas piped by Washington Gas Light Company. No new gas connections available. Oil on local delivery. | |
| | | | 1978 Enrollment : 1491 | | | Water Supply | |
| | | | Higher Education | | | Source : Charles County Sanitary District. Four wells of flow capacity 757.1 liters (200 gal) per minute. Elevated storage in three tanks of total capacity 11.7 million liters (3.1 million gal). | |
| | | | Charles County Community College is 6.4 km (4 mi) west of La Plata. Current enrollment 2500. Two year programs are transferable. | | | | |
| | | | George Washington University and the University of Maryland provide off-campus courses. | | | Adequacy of service : Requires expansion. | |
| | | | | | | Expansion plans : A fifth well is currently being drilled to raise total capacity by 1892.7 liters (500 gal) per minute. (1978 data) | |
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| West Point, VA (King William County) 37° 32' N 76° 48' W | 1970 census : 2600 | Houses | West Point Public Schools | Doctors | Parks : 4 | Electric Power | |
| | 1977 : 2750 | Total units : 805 | Elementary Schools | Total number : 5 | Athletic Fields : 3 | Source : 60% of county Virginia Electric Cooperative. 40% VEPCO (including West Point). | |
| | 1980 projection : 2900 | Renter-occupied : 596 | Number of schools : 1 | Doctor/population ratio : 1/550 | (1978 data) | Type : Nuclear and oil. | |
| | | Average monthly rent : \$175 | (grades K-7) | Dentists | | Future plants : VEPCO development. | |
| | | Vacancy rate : 8% | Enrollment capacity : 500 | Total number : 4 | | | |
| | | New house starts : 14 | 1977/78 Enrollment : 458 | Dentist/population ratio : 1/688 | | | |
| | | Number of sales : 30 | 1980 Projection : 460 | Hospitals and Nursing Homes | | Sewage Disposal | |
| | | Average sale price : \$45,000 | High Schools | None | | Number of plants : 1 | |
| | | | Number of schools : 1 | Nearest hospital 32.2 km (20 mi) at Williamsburg. (1976) | | Type of treatment: Primary and secondary with chlorination. Designed for population of 3000. | |
| | | | Enrollment capacity : 350 | | | Flow capacity PD : 1,135,590 liters (300,000 gal) | |
| | | Apartment | 1977/78 Enrollment : 285 | | | Actual flow PD : 1,892,650 liters (500,000 gal) | |
| | | Total units : 20 | 1980 Projection : 300 | | | Facility improvement planned. | |
| | | Average monthly rent : \$175 | Vocational Schools | | | | |
| | | Vacancy rate : 1% | Hamilton-Holmes Elementary School in King William County for disadvantaged and handicapped. | | | Heating Fuels | |
| | | (1977 data) | Higher Education | | | Types available : Oil and electricity. | |
| | | | Rappahannock Community College (south campus) 19.3 km (12 mi) from West Point at Glenss, Gloucester County. | | | Service available : Home delivery. Four major bulk handling facilities in town. | |
| | | | Enrollment capacity : 1125 | | | Water Supply | |
| | | | 1977/78 Enrollment (day students) : 700 | | | Source : Two wells. No treatment. | |
| | | | (evening students) : 900 | | | Capacity : Elevated storage 2,271,180 liters (600,000 gal) | |
| | | | 1980 Projection : (No change) | | | Well pumps rate of flow 1362.7 liters (360 gal) per minute. | |
| | | | Two year courses in occupational and technical fields, liberal arts and sciences and college preparation. | | | Consumption PD : 851,693 to 1,135,590 liters (225,000 to 300,000 gal). | |
| | | | West Point is 40.2 km (25 mi) from College of William and Mary, Williamsburg. Enrollment 7000. Full degree courses in arts, sciences, law and business. | | | Adequacy of service : Good. | |
| | | | | | | Expansion plans : Third well proposed. (1978 data) | |
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| Woodbridge, VA (Prince William County) 38° 40' N 77° 15' W | 1970 census : 25,412 | Houses and apartments (Prince William County, excluding the Manassas cities) | Woodbridge Public Schools | Doctors | Parks : 4 | Electric Power | |
| | 1977 : 30,000 | As for Dale City. | Elementary Schools | Total number : 36 | Athletic Fields : 5 | Source : VEPCO | |
| | 1980 projection : 30,500 | | Number of schools : 6 | Doctor/population ratio : 1/833 | Tennis Facilities : 12 | Type : Nuclear, coal and oil. | |
| | | | Enrollment capacity : 3515 | Prince William County Dentists (excluding the Manassas cities) | (1978 data) | Future plants : VEPCO development. | |
| | | | 1977/78 Enrollment : 3002 | Total number : 33 | | | |
| | | | 1980 Projection : 3030 | Dentist/county population ratio : 1/4370 | | Sewage Disposal | |
| | | | Junior High Schools | Hospitals | | Number of plants : 6 | |
| | | | Number of schools : 2 | Total number : 1 | | Type of treatment: Secondary with chlorination. | |
| | | | Enrollment capacity : 3120 | (Potomac Hospital) | | Flow capacity PD : 25.7 million liters (16.8 million gal) | |
| | | | 1977/78 Enrollment : 2752 | Total beds : 250 | | Actual flow PD : 19.3 million liters (5.1 million gal) | |
| | | | 1980 Projection : 2780 | Intensive care unit of five beds | | | The Woodbridge, Occoquan, Dumfries Sanitary District has regional plant under construction of capacity 45.4 million liters (12 million gal) per day. Completion date, October 1979. |
| | | | Secondary Schools | Coronary care unit of four beds | | | |
| | | | Number of schools : 1 | Prince William Hospital, Manassas, 154 beds, is at 24.1 km (15 mi). | | | |
| | | | Enrollment capacity : 2875 | U. S. Naval Hospital Quantico, 75 beds, is at 16.1 km (10 mi) | | | |
| | | | 1977/78 Enrollment : 3419 | Nursing Homes | | Heating Fuels | |
| | | | 1980 Projection : 3453 | Total number : 1 | | Types available : Oil and natural gas. | |
| | | | Special Education and Vocational Schools | Total beds : 120 | | Service available : Washington Gas Light Company and Columbia Gas of Virginia pipe gas to consumers. Oil by local delivery. | |
| | | | As for Manassas | (1976 data) | | | |
| | | | Private Schools | | | Water Supply | |
| | | | As for Manassas | | | Source : Fairfax County Water Authority and the Occoquan Reservoir. Storage capacity 16.3 million liters (4.3 million gal). | |
| | | | Higher Education | | | Adequacy of service : Adequate. No plans for early expansion. (1978 data) | |
| | | | Northern Virginia Community College (Woodbridge campus) | | | | |
| | | | Enrollment capacity : 4088 | | | | |
| | | | 1977/78 Enrollment : 4088 | | | | |
| | | | 1985 Projection : 8000 | | | | |
| | | | Expansion program is in progress. College provides two year courses that are transferable. | | | | |
| | | | George Mason University in Fairfax County, which offers a full four year curriculum, is within commuting distance. Several colleges and universities within the Washington D. C. area are also available. | | | | |
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1 VEPCO: Virginia Electric Power Company
2 PD: per day

C. PORTS

| NAME AND LOCATION | TYPE AND GENERAL CONDITION | FACTORS LIMITING LARGEST VESSEL | HYDROLOGIC CONDITIONS AND UNUSUAL GEOPHYSICAL CONDITIONS | PIERS AND WHARVES | MECHANICAL HANDLING FACILITIES | STORAGE FACILITIES | CLEARANCE FACILITIES | REMARKS |
|---|--|---|---|--|--|--|---|--|
| <div>Name: Port of Alexandria</div> <div>Location: 38° 48' N 77° 02' W</div> | <div>Type: Improved natural river port</div> <div>Condition: Good</div> <div>Cargo Handling: 148,000 t¹ (163,140 s ton) handled in 1977.</div> | <div>Approaches: Minimum depth: 6.7 m (22 ft) Minimum width: 61.0 m (200 ft)</div> <div>Anchorage: Maximum diameter: 457.2 m (1500 ft) Minimum depth: 7.3 m (24 ft) Turning basin at Alexandria 91.4 m (300 ft) by 2042.2 m (6700 ft)</div> <div>Alongside Berths: Minimum depth: 6.7 m (22 ft) Maximum length: 97.5 m (320 ft)</div> | <div>Tidal Ranges: Mean tidal range is 0.7 m (2.3 ft)</div> | <div>Number: Two</div> <div>Uses: Break-bulk handling of news-print, petroleum products, wood, furniture, chemicals and other general cargo.</div> <div>Type of Construction: Wood decks and steel piles.</div> <div>Number of Berths: Two Length 97.5 m (320 ft) each. Depth alongside 6.7 m (22 ft) Height of deck 3.5 m (11.5 ft) (above MLLW)²</div> | <div>Handling Equipment: Various fork-lift trucks and other types of portable yard equipment with maximum capacities 3.6 t (4 s ton)</div> | <div>Both piers are open. Adjacent to them are the following: Covered storage 23,225 m² (250,000 ft²)</div> <div>Open storage 8361 m² (90,000 ft²)</div> | <div>Railroads: The Southern Railway serves the dockside and connects via the Pennsylvania Railroad through Fredericksburg to within 3.2 km (2 mi) of Fort A. P. Hill. 52,000 t (57,320 s ton) general cargo was handled in port area in 1977.</div> <div>Roads: Road routing is via Interstate Highway 95 or U. S. Highway 1 and 17.</div> <div>Air: National Airport, Washington D. C., is situated 6.4 km (4 mi) north of the port via local routing.</div> | |
| <div>Name: Port of Baltimore</div> <div>Location: 39° 17' N 76° 35' W</div> | <div>Type: Improved natural river port</div> <div>Condition: Excellent</div> <div>Cargo Handling: 44,134,000 t (48,648,908 s ton) handled in 1976.</div> | <div>Approaches: a. Virginia Capes to Fort McHenry 278.4 km (173 mi) Minimum depth: 15.2 m (50 ft) Minimum width: 243.8 m (800 ft) b. Connecting Channel Chesapeake and Delaware Canal Minimum depth: 10.7 (35 ft) Minimum width: 182.9 m (600 ft) c. Curtis Bay Minimum depth: 15.2 m (50 ft) Minimum width: 182.9 m (600 ft) Turning basin at head of bay 274.3 m (900 ft). d. Curtis Creek Minimum depth: 10.7 m (35 ft) Minimum width: 61.0 m (200 ft) e. Middle Branch Minimum depth: 12.8 m (42 ft) Minimum width: 182.9 m (600 ft) reduced to 8.2 m (27 ft) and 76.2 m (250 ft) at inner harbor f. Northwest Branch Minimum depth: 14.9 m (49 ft) Minimum width: 182.9 m (600 ft)</div> <div>Anchorage: Six general anchorages with draft limitations ranging from 15.2 m (50 ft) to 5.8 m (19 ft). Maximum diameter: 475.5 m (1560 ft)</div> <div>Alongside Berths: Minimum depth: 3 m (10 ft) Maximum length: 1158.2 m (3800 ft)</div> | <div>Tidal Ranges: Mean tidal range is 0.3 m (1.1 ft). Prolonged winds of constant direction may cause substantial variation.</div> | <div>Number: 171</div> <div>Uses: Break-bulk and containerized general cargo, dry and liquid bulk products, including coal, iron ore, scrap metal petroleum products, grain, chemicals, sugar, automobiles and heavy equipment.</div> <div>Types of Construction: Concrete, steel or timber piles and decks. Steel catwalks and steel sheet or masonry bulkheads. Steel grain and bulk chemical towers and concrete aprons.</div> <div>Number of Berths: 185 Lengths 6.7 m (22 ft) to 1158.2 m (3800 ft) Depths alongside 3 m (10 ft) to 13.7 m (45 ft) Height of decks 1.2 m (4 ft) to 4.6 m (15 ft) (above MLLW)</div> | <div>Cranes: Shore based and floating hoisting equipment for general cargo cover wide range. Most of 78 major equipments located at individual wharves and piers used by operating company. These range from 68.0 t (75 s ton) electric or diesel electric traveling gantry cranes and container cranes to 1.4 t (1.5 s ton) gasoline mobile cranes, including clamshells and magnets. Additionally, a 317.5 t (350 s ton) shore based heavy lift electric derrick owned by the Maryland Port Administration, a 249.5 t (275 s ton) floating diesel derrick owned by the Bethlehem Shipyards and several medium capacity equipments owned by the Canton and Western Maryland Railway Companies are available for hire.</div> <div>Oil Berth Hoses: Hoses of sizes ranging from 76.2 mm (3 in) to 609.6 mm (24 in) with power operated and manual handling davits at 25 locations.</div> <div>Grain Elevators (North West Branch, Locust Point and Covington): Maximum handling 457.7 m³ per hr (13,500 bu per hr) vessel to elevator and 12,334 m³ per hr (350,000 bu per hr) elevator to vessel. Equipment includes loading spouts, rail car and truck unloading pits, car dumpers, belt conveyors, driers, washers, scales, temperature recorders, electric trimmers and dust control systems.</div> <div>Ore and Coal Handling: 19 traveling unloaders, bridge cranes, loading towers and conveyor systems at 11 locations. Coal piers served by rail car dumpers at a rate of ten 90.7 t (100 s ton) cars per hr. Capacity of unloaders from 544.3 to 5443.2 t (600 to 6000 s ton) per hr.</div> <div>Dry and Wet Bulk Handling (other than ore and coal): At 18 locations, bulk handling of such items as latex, molasses, fertilizer, caustic soda, sulphuric acid, liquid sulphur, bauxite and cement by pipeline and hose handling towers or by crane, clamshells and conveyor belt systems. Bagging plants have capacity of 907.2 t (1000 s ton) per day.</div> <div>Other Equipment: Container transporters, fork-lift trucks, tractors and trailers and other types of mechanized and portable allied equipment to handle containerized, break-bulk and roll-on/roll-off cargo.</div> | <div>Covered Storage (General): 163,570.9 m² (1,760,720 ft²) plus 484,343.4 m² (5,213,600 ft²) dry warehouse storage space and 425,454.1 m² (4,579,700 ft²) of cooler and freezer space.</div> <div>Open Storage: 2,023,362 m² (21,780,000 ft²) at 10 water front locations plus 149,728.8 m² (1,611,720 ft²) at 8 storage warehouses in the city area.</div> <div>Oil Storage: 33,074,676 hectoliters (20,804,300 bbl) in 449 tanks at 25 locations. This includes for bunkering although most large vessels are bunkered at berth by tank barges.</div> <div>Liquid Storage (other than petroleum products): 184,700,000 liters (48,800,000 gal).</div> <div>Grain Storage: 452,404.1 m³ (12,837,800 bu) at three elevators in concrete silos.</div> | <div>Railroads: The Chesapeake and Ohio Railway, the Consolidated Rail Corporation and the Western Maryland Railway all serve with spurs to the dockside. The Canton Railroad serves the eastern docks area. Routing to Fort A. P. Hill is via the Baltimore and Ohio and Pennsylvania Railroads through Washington D. C. and Fredericksburg. Closest point to post is 3.2 km (2 mi) from the western boundary.</div> <div>Roads: Road routing is via Interstate Highway 95 and U. S. Highway 17.</div> <div>Air: Baltimore-Washington International Airport is located 16.1 km (10 mi) from the port. The airport contains an air cargo complex of 80,934.5 m² (871,200 ft²) with covered storage of 14,864 m² (16,000 ft²).</div> | <div>This summary does not include information on the Bethlehem Steel Corporation and other ship building, repair and breaking yards, docks and wharves in the area. Future improvements to the harbor approaches include widening and deepening of the Brewerton Extension of the West Channel from 8.2 m (27 ft) deep and 121.9 m (400 ft) wide to 10.7 m (35 ft) and 182.9 m (600 ft); also widening the Tolchester Section from 137.2 m (450 ft) to 182.9 m (600 ft) and the Swan Point Channel from 137.2 m (450 ft) to 182.9 m (600 ft).</div> <div>The construction of an additional 135,400,000 m² (1,458,000,000 ft²) disposal site in the port area has been proposed by the State of Maryland.</div> <div>Two additional container berths 457.2 m (1500 ft) long, two 36.3 t (40 s ton) container cranes, a 272.2 t (300 s ton) heavy lift crane and a 13,066 m² (140,000 ft²) container shed are planned for Dundalk Marine Terminal. In 1978 construction has begun at Locust Point on a three-berth marginal quay and 161,869 m² (1,742,400 ft²) of back-up land including two 36.3 t (40 s ton) container cranes and an 11,148 m² (120,000 ft²) container shed.</div> |
| <div>Name: Port of Cambridge (deep water terminal)</div> <div>Location: 38° 35' N 76° 02' W</div> | <div>Type: Natural river port</div> <div>Condition: Good to fair</div> <div>Cargo Handling: 47,234.3 t (52,066 s ton) unloaded in 1973. No products are shipped from the port.</div> | <div>Approaches: (from Choptank River to terminal) Minimum depth: 6.1 m (20 ft) Minimum width: 45.7 m (150 ft)</div> <div>Anchorage: Anchorages are located each side of approach channel to inner harbor below Market Street bridge.</div> <div>Westside: depth 3.0 m (10 ft) length 121.9 m (400 ft) width 175 ft</div> <div>Eastside: depth 3.0 m (10 ft) length 68.6 m (225 ft) width 61.0 m (200 ft)</div> <div>Alongside Berths: Minimum depth: 7.6 m (25 ft) Maximum length: 152.4 m (500 ft) Triangular turning basin at terminal, depth 7.6 m (25 ft) and extreme width 251.5 m (825 ft)</div> | <div>Tidal Ranges: Mean tidal range is 0.5 m (1.6 ft). Spring tide 0.6 m (1.8 ft)</div> | <div>Number: One marginal wharf</div> <div>Uses: Import of frozen fish products in freezer-hold break-bulk vessels, cheese, cod-liver oil and other bulk foods.</div> <div>Type of Construction: Concrete. Steel sheet bulkheads and bituminous surface.</div> <div>Number of Berths: One Length 152.4 m (500 ft) Depth alongside 7.6 m (25 ft) Height of deck 3.0 m (10 ft) (above MLLW)</div> | <div>Ship hoisting equipment used for most handling. Fork-lift trucks and tractors and trailers and other types of yard equipment available.</div> | <div>Covered Storage: 1858 m² (20,000 ft²) unheated space on dockside. 14,864 m² (160,000 ft²) refrigerated storage situated 0.8 km (0.5 mi) from dockside.</div> <div>Open Storage: 19,509 m² (210,000 ft²)</div> | <div>Railroads: There is a rail spur to the dockside but no direct rail link with Fort A. P. Hill. Routing would be via the Pennsylvania Central Railroad through Seaford, Delaware and Baltimore or Norfolk.</div> <div>Roads: Road access is via U. S. Highway 50, the Chesapeake Bay Bridge and Interstate Highway 95 around Washington D. C. and Fredericksburg, a distance of 241.5 km (150 mi).</div> | <div>To facilitate the future trend in increasing size of refrigerator vessels it is proposed to maintain a deeper approach channel of depth 7.6 m (25 ft) and width 45.7 m (150 ft) from the Choptank River for 609.6 m (2000 ft) and to widen into the triangular turning basin 426.7 m (1400 ft) from the terminal at a maximum width of 228.6 m (750 ft).</div> |

C. PORTS (Continued)

| NAME AND LOCATION | TYPE AND GENERAL CONDITION | FACTORS LIMITING LARGEST VESSEL | HYDROLOGIC CONDITIONS AND UNUSUAL GEOPHYSICAL CONDITIONS | PIERS AND WHARVES | MECHANICAL HANDLING FACILITIES | STORAGE FACILITIES | CLEARANCE FACILITIES | REMARKS |
|---|---|--|--|---|--|---|---|---|
| Name: Port of Cheatham (Naval Supply Center Annex) Location: 37° 17' N 76° 35' W | Type: River port Condition: Good Cargo Handling: General naval cargo handling at a peacetime rate of 22.12 t (20 t) per hatch per hour. | Approaches: Minimum depth: 10.7 m (35 ft) to Gloucester Point, 6.7 m (22 ft) to pier. Minimum width: 91.4 m (300 ft) Anchorages: Naval anchorages as for Naval Weapons Station. Minimum depth: 6.1 m (20 ft) Alongside Berths: Minimum depth: 9.8 m (32 ft) Maximum length: 370.3 m (1215 ft) | Tidal Ranges: Mean tidal range 0.8 m (2.5 ft) | Number: Two Uses: Handling of general naval stores. Type of Construction: Part timber, part concrete. Number of Berths: Two Length 370.3 m (1215 ft) Depth alongside 9.8 m (32 ft) Height of deck 3.0 m (10 ft) (above MLLW) | Cranes: Two 2.7 t (3 s ton) on Pier Two. Other Equipment: Vehicles, flat-beds and allied portable equipment for handling stores. | Covered Storage: 92,900 m ² (1,000,000 ft ²) unheated warehouse. 41,805 m ² (450,000 ft ²) de-humidified space in three buildings. 6503 m ² (70,000 ft ²) refrigerated storage. Open Storage: 1,214,017.2 m ² (13,068,000 ft ²) | Railroads: Rail clearance is by Chesapeake and Ohio Railroad which lies 9.7 km (6 mi) from the port via Williamsburg and Richmond to within 3.2 km (2 mi) of Fort A. P. Hill. Rail spur to dockside. Roads: Road routing is via State Highway 199 to Interstate Highway 64, Interstate Highway 95 from Richmond and State Highway 207. | There is very little storage currently available for transient personnel and equipment. |
| Name: Port of Chesapeake Location: 36° 48' N 76° 17' W | Type: Improved natural river port Condition: Excellent Cargo Handling: See Port of Norfolk | Approaches: a. Southern Branch Elizabeth River to Paradise Creek Minimum depth: 12.2 m (40 ft) Minimum width: 137.2 m (450 ft) b. Southern Branch from Paradise Creek to Intra-Coastal Waterway Minimum depth: 10.7 m (35 ft) Minimum width: 76.2 m (250 ft) Alongside Berths: Minimum depth: 4.6 m (15 ft) Maximum length: 310.9 m (1020 ft) | Tidal Ranges: Mean tidal range is 0.8 m (2.7 ft) Extreme range 1.0 m (3.4 ft) | Number: 23 Uses: Petroleum products, chemicals, grain, cement, scrap metal, liquid and dry bulk handling and storage. Types of Construction: Concrete, steel or timber piles and decks. Steel catwalks and steel sheet bulkheads. Steel grain and bulk chemical towers with concrete aprons. Number of Berths: 27 Lengths 12.2 m (40 ft) to 310.9 m (102 ft) Depths alongside 4.6 m (15 ft) to 12.2 m (40 ft) Height of decks 2.1 m (7 ft) to 3.7 m (12 ft) (above MLLW) | Cranes (Elizabeth River Terminals): Three 45.4 t (50 s ton) gantry cranes. One 40.8 t (45 s ton) gantry crane. Equipment includes clamshells and magnets. Bulk loading rate maximum 725.8 t (800 s ton) per hr. Oil and Natural Gas Berth Hoses: Multiple hoses of sizes ranging from 101.6 to 355.6 mm (4 to 14 in), with hydraulic, electric or manual handling cranes at 12 locations. Grain Elevators (Cargill Inc. opposite Paradise Creek): Elevators with maximum handling rate of bulk grain or soybean meal at 1659 t (1500 t) per hr. Hydraulic unloading equipment. Dry and Wet Bulk Handling: Unloading towers, electric booms and clamshell buckets, receiving hoppers and belt conveyors to fertilizer plants or storage, with dry chemical loading rates of 90.7 to 136.1 t (100 to 150 s ton) per hr at seven locations. Liquid sulphur handling via two loading spouts and three 254 mm (10 in) hoses and electric loading arms at one location. Two dry cement hydraulic rail-mounted receiving hoppers and belt conveyors with loading capacity of 1270.1 t (1400 s ton) per hr at two locations. Other Equipment: Portable bagging machines. Automatic bulk weighing systems capacity 408.2 t (450 s ton) per hr. Covered conveying systems. | Covered Storage: 20,903.2 m ² (225,000 ft ²) plus 74,322.4 m ² (800,000 ft ²) warehouse storage. Liquid Storage (other than petroleum products): 22,711,800 liters (6,000,000 gal). Open Storage: 185,806 m ² (2,000,000 ft ²) Oil Storage: 9,930,867.4 hectoliters (6,246,300 bbl) in 269 tanks. Liquified petroleum gas 381,571.2 hectoliters (240,000 bbl) in one tank at 15.6 C (60 F). Grain Storage: Silo capacity of 211,440 m ³ (6,000,000 bu) plus 13,608 t (15,000 s ton) soy bean meal. Cement Storage: 104,064.3 m ³ (900,000 bbl) Fertilizer Storage: 239,500.8 t (264,000 s ton). Creosote Storage: 4,682,416 liters (1,237,000 gal). | See Port of Portsmouth. | No information is included in this summary on the ship breaking and ship repair yards and wharves in the area. |
| Name: Port of Hampton Location: 37° 02' N 76° 21' W | Type: Natural river port Condition: Good | Approaches: Minimum depth: 3.7 m (12 ft) Minimum width: a. Hampton Creek 45.7 m (150 ft) b. Sunset Creek 30.5 m (100 ft) reducing to 24.4 m (80 ft) Anchorages: Hampton Roads anchorages as for Newport News and Norfolk. Alongside Berths: Minimum depth: 1.2 m (4 ft) Maximum length: 120.1 m (395 ft) | Tidal Ranges: Mean tidal range 0.8 m (2.7 ft) Extreme range 1.0 m (3.4 ft) | Number: 27 Uses: Coal, petroleum products, sand and gravel and seafood handling and storage. Types of Construction: Timber piles and decks with some concrete bulkheads and part concrete decking and solid fill. Steel sheeting on some decks. Number of Berths: 35 Length 7.6 m (25 ft) to 120.1 m (395 ft) Depths alongside 1.2 m (4 ft) to 4.3 m (14 ft) Height of decks 1.5 m (5 ft) to 2.6 m (8.5 ft) (above MLLW) | Cranes: Four 2.7 t (3 s ton) diesel crawler cranes with 18.3 m (60 ft) booms and clamshells. One steam, four hand operated and 22 electrically operated derricks and clamshells. Fuel Hoses: Two 203-mm (8 in) One 101.6 mm (4 in) Nineteen 76.2 mm (3 in) Hoses are at seven locations. There are eleven metered fuel pumps on wharfsides. Boat Lift: One 31.8 t (35 s ton) vertical boat lift, 0.8 km (0.5 mi) west bank Hampton Creek. Other Equipment: One 254 mm (10 in) suction pipeline for unloading fish. Four ice crushing plants with loading spouts for crushed ice. Maximum capacity 63.5 t (70 s ton) per hr. Three truck loading hoppers and fork-lift trucks. Ready-mix concrete plant at Sunset Creek. | Covered Storage: 10 seafood processing plants. Two cold stores with capacity 9071.8 kg (20,000 lb). 72,574.4 kg (160,000 lb) live lobster holding in 20 tanks. Open Storage: Coal 6804 t (7500 s ton) capacity. Sand and gravel 7257.6 t (8,000 s ton) capacity. Oil Storage: 65,417.2 hectoliters (41,146 bbl) in 54 tanks. | Railroads: The Chesapeake and Ohio Railway serves the town of Hampton but there are no rail spurs to the port area. From Hampton, a rail link via Richmond runs within 3.2 km (2 mi) of Fort A. P. Hill. Roads: Road routing is via Interstate Highway 64 which passes through the town of Hampton, Interstate 95 and State Highway 207. Air: Langley Air Force Base is situated 4.8 km (3 mi) from the port via local roads. | |
| Name: Port of Hopewell Location: 37° 18' N 77° 16' W | Type: Artificial river port Condition: Excellent Cargo Handling: 1,406,160 t (1,550,000 s ton) handled in 1977. | Approaches: Minimum depth: 7.6 m (25 ft) Minimum width from James River mouth: 91.4 m (300 ft) Anchorages: Hampton Roads anchorages, before entering James River. Alongside Berths: Minimum depth: 7.9 m (26 ft) Maximum length: 179.8 m (590 ft) | Tidal Ranges: Mean tidal range is 0.8 m (2.5 ft) Water level can be affected by heavy rain run-off into river. | Number: Two Uses: Handling of dry bulk chemicals. Type of Construction: Concrete paved decks, timber and concrete piles. Number of Berths: Four Length 179.8 m (590 ft) Depth alongside 7.9 m (26 ft) Height of decks 4.6 m (15 ft) (above MLLW) | Hoppers and rail car dumpers. Conveyor belt system and pipelines to storage area 0.3 km (0.2 mi) from the piers. | Partially Covered Storage: 16,186.9 m ² (174,240 ft ²) | Railroads: The Norfolk and Western Seaboard Coastline Railroad connects the pier side to Richmond and to within 3.2 km (2 mi) of Fort A. P. Hill. Roads: Road routing is via State Highway 10, Interstate Highway 95 and State Highway 207. | This is a private installation with no public docking, owned by Allied Chemical and Dye Corporation. No expansion or alterations are planned. |

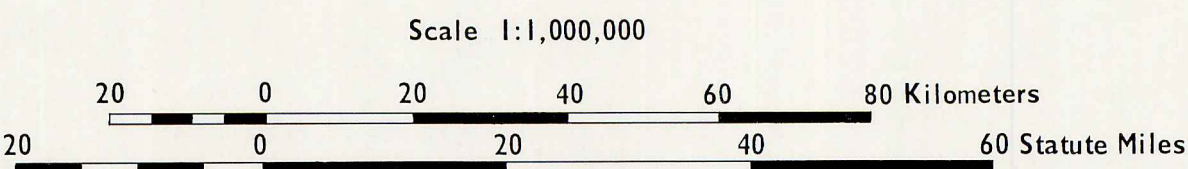
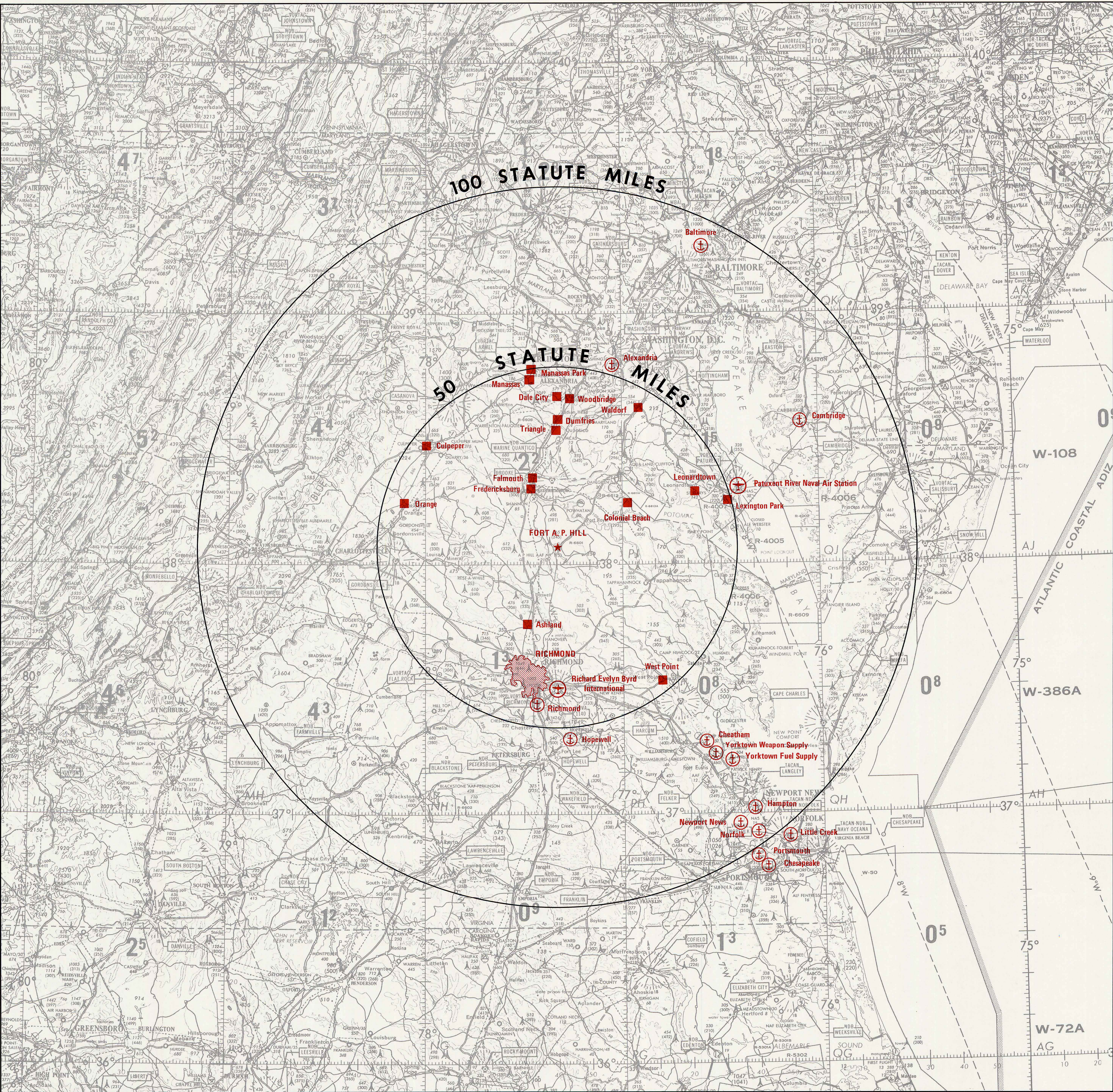
C. PORTS (Continued)

| NAME AND LOCATION | TYPE AND GENERAL CONDITION | FACTORS LIMITING LARGEST VESSEL | HYDROLOGIC CONDITIONS AND UNUSUAL GEOPHYSICAL CONDITIONS | PIERS AND WHARVES | MECHANICAL HANDLING FACILITIES | STORAGE FACILITIES | CLEARANCE FACILITIES | REMARKS |
|---|---|--|---|---|---|--|---|--|
| <div>Name: Port of Little Creek (Naval Amphibious Base)</div> <div>Location: 36° 55' N 76° 10' W</div> | <div>Type: Improved natural port</div> <div>Condition: Good</div> <div>Cargo Handling: Not a commercial port but equipped for receipt and supply of ships stores fuel and ammunition.</div> | <div>Approaches: Minimum depth: 6.1 m (20 ft) at entrance. 5.5 m (18 ft) safe draft. Minimum width: 121.9 m (400 ft) between buoys. Turning basin within harbor, width 378.0 m (1240 ft), length 353.6 m (1160 ft)</div> <div>Anchorage: South of Thimble Shoal Channel in Lynnhaven Roads and also west of Chesapeake Bay bridge/tunnel, minimum depth 6.1 m (20 ft)</div> <div>Alongside Berths: Minimum depth: 6.1 m (20 ft) Maximum length: 434.3 m (1425 ft)</div> | <div>Tidal Ranges: Mean tidal range 0.8 m (2.6 ft)</div> | <div>Number: 23</div> <div>Uses: Replenishment, repair and maintenance of amphibious support naval vessels.</div> <div>Types of Construction: Either timber or concrete piles and decks.</div> <div>Number of Berths: 23 Lengths 121.3 m (398 ft) to 434.3 m (1425 ft) Depths alongside 6.1 m (20 ft) to 7.6 m (25 ft) Height of decks 1.5 m (5 ft) to 3.2 m (10.5 ft) (above MLLW)</div> <div>Limitations on use: Piers 11 to 19, 56 to 59 limited in ammunition handling to small arms and pyrotechnics. Quay wall limited to 544.3 kg (1200 lb) in explosives weight.</div> | <div>Cranes: One 90.7 t (100 s ton) floating crane.</div> <div>Floating Dry Dock: Length 91.4 m (300 ft) Capacity 907.2 t (1000 s ton)</div> <div>Other Equipment: Fork-lift trucks, vehicles, flatbeds and other types of mechanical and portable equipment for handling stores and ammunition.</div> | <div>Covered Storage: 9290 m² (100,000 ft²) associated with technical stores and provisions for amphibious maintenance and supply support.</div> | <div>Railroads: The Pennsylvania Central Railroad serves the port area and is linked by the Norfolk and Portsmouth Belt Line and Norfolk and Western Railroad via Suffolk, Petersburg and Richmond to within 3.2 km (2 mi) of Fort A. P. Hill.</div> <div>Roads: Road routing is via U. S. Highway 60 and Interstate Highway 64, the Hampton Roads bridge/tunnel, Interstate Highway 95 and State Highway 207.</div> <div>Air: Norfolk International Airport is approximately 4.8 km (3 mi) from the port via U. S. Highway 60 and local roads. The Naval Air Station Norfolk lies 12.9 km (8 mi) from the port via U. S. Highway 60.</div> | <div>There would be very limited accommodation and storage space available for transient personnel and equipment.</div> |
| <div>Name: Port of Newport News</div> <div>Location: 36° 58' N 76° 26' W</div> | <div>Type: Improved natural port</div> <div>Condition: Excellent</div> <div>Cargo Handling: 12,980,217 t (14,308,000 s ton) handled in 1976.</div> | <div>Approaches: Minimum depth: 13.7 m (45 ft) Minimum width: 243.8 m (800 ft)</div> <div>Anchorage: (two deep draft) Minimum depth: 12.2 m (40 ft)</div> <div>Alongside Berths: Minimum depth: 9.8 m (32 ft) [Exxon barge dock at south end of port has minimum depth of 5.8 m (19 ft)] Maximum length: 332.2 m (1090 ft)</div> | <div>Tidal Ranges: Mean tidal range 0.8 m (2.7 ft) Extremes 0.6 m (2.1 ft) and 0.9 m (3.0 ft)</div> | <div>Number: 12</div> <div>Uses: Break-bulk, containerized, heavy-lift roll-on/roll-off, LASH³, general cargo and liquid and dry bulk, including iron ore, scrap iron, bauxite, coal, sulphur, lumber, petroleum products, automobiles and machinery.</div> <div>Types of Construction: Either concrete piles and decks with timber fenders or timber piles and decks. Steel sheet pile bulkheads also fitted in some cases.</div> <div>Number of Berths: 25 (including three tanker berths), Lengths 7.9 m (26 ft) to 332.2 m (1090 ft) Depths alongside 5.8 m (19 ft) to 13.7 m (45 ft) Height of decks 1.5 m (5 ft) to 4.6 m (15 ft) (above MLLW)</div> | <div>Cranes: Two 45.4 t (50 s ton) mobile gantry cranes. One 44.2 t (40 l ton) bridge crane. One 44.2 t (40 l ton) gantry crane. Two 27.2 t (30 s ton) gantry cranes equipped with 2032 mm (80 in) magnets, which can be coupled to lift 50.8 t (56 s ton) Nine 5.4 t (6 s ton) truck cranes.</div> <div>Oil Berth Hoses (Exxon pier): One 508 mm (20 in) Five 30b mm (12 in) Two 254 mm (10 in) Two 203 mm (8 in) Hoses equipped with pneumatically operated double booms for handling between mooring platforms and tank farms.</div> <div>Coal Loading Towers (Piers 14 & 15): Four electric coal loading towers of 4082.4 t (4500 s ton) capacity per hr each, with conveyors and rotary railroad car dumpers.</div> <div>Other Equipment: 90 fork-lifts of 4.5 t (5 s ton) capacity. 93 tractors and trailers of 2.7 t (3 s ton) capacity. Five truck unloading docks. Four 31.8 t (35 s ton) container carriers.</div> | <div>Covered Storage: 75,899 m² (817,000 ft²) on piers backed by 185,800 m² (2,000,000 ft²) general and cold warehousing.</div> <div>Open Storage: 8361 m² (90,000 ft²) on piers.</div> <div>Oil Storage: 825,147.7 hectoliters (519,000 bbl) in 15 tanks.</div> | <div>Railroads: Chesapeake and Ohio Railroad provides shipment from the dockside. A rail link via Richmond runs within 3.2 km (2 mi) of Fort A. P. Hill.</div> <div>Roads: Road routing is via Interstate Highways 64 and 95 and State Highway 207.</div> <div>Air: Langley Air Force Base is located approximately 9.7 km (6 mi) from the port via local routing.</div> | <div>Not detailed in this summary is the ship building and repair facility at Newport News.</div> |
| <div>Name: Port of Norfolk (including Norfolk Naval Station)</div> <div>Location: 36° 55' N 76° 20' W</div> | <div>Type: Improved natural roadstead and river port.</div> <div>Condition: Excellent</div> <div>Cargo Handling: 34,053,566 t (37,537,000 s ton) handled in 1976, combined with Ports of Portsmouth and Chesapeake.</div> | <div>Approaches: a. International Terminals, Sewell's Point Minimum depth: 13.7 m (45 ft) Minimum width: 457.2 m (1500 ft) b. General Cargo Terminals, Lambert Point Minimum depth: 12.2 m (40 ft) Minimum width: 243.8 m (800 ft) c. Elizabeth River, Eastern Branch Minimum depth: 7.6 m (25 ft) Minimum width: 106.7 m (350 ft)</div> <div>Anchorage: a. Two deep draft opposite Sewell's Point, minimum depth 12.2 m (40 ft) b. Three deep draft opposite Lambert Point, minimum depth 6.1 m (20 ft)</div> | <div>Tidal Ranges: Mean tidal range 0.8 m (2.7 ft) Extreme range 1.0 m (3.4 ft)</div> | <div>Number: 48</div> <div>Uses: Break-bulk, containerized heavy-lift, roll-on/roll-off, liquid and dry bulk handling. General cargo, coal, grain, fertilizers, petroleum products, foodstuffs, machinery. Passenger handling facilities. Naval piers provide for maintenance and resupply of most categories of combatant and support vessels.</div> <div>Types of Construction: Concrete piles and concrete or steel mesh decks with timber fender systems.</div> <div>Number of Berths: 81 (including two tanker berths), Lengths 15.2 m (50 ft) to 548.6 m (1800 ft) Depths alongside 6.1 m (20 ft) to 14.2 m (465 ft) Height of decks 1.4 m (4.5 ft) to 3.6 m (11.8 ft) (above MLLW)</div> | <div>Cranes: One 99.8 t (110 s ton) gantry crane. Three 55.3 t (50 l ton) container cranes. Five 27.2 t (30 s ton) container cranes. Two 22.7 t (25 s ton) gantry cranes. Three 13.6 t (15 s ton) gantry cranes with 1397 mm (55 in) magnets, clamshells and buckets. One 6.4 t (7 s ton) crane with 1270 mm (50 in) magnet. Cargo beams fitted to most loading shed roofs. Large number of truck mounted cranes.</div> <div>Naval Equipment: Four 22.7 t (25 s ton) gantry cranes. Six 22.7-90.7 t (25-100 s ton) floating cranes. Seventeen 4.5-54.4 t (5-60 s ton) auto cranes.</div> <div>Oil Berth Hoses: a. Exxon pier Sewell's Point One 609.6 mm (24 in) Two 457.2 mm (18 in) One 406.4 mm (16 in) Two 355.6 mm (14 in) Three 304.8 mm (12 in) Four 203.0 mm (8 in) Three 152.4 mm (6 in) Hand operated or powered handling davits. b. Naval Equipment Craney Island 152.4 to 457.2 mm (6 to 18 in) fuel outlets. Total of 32 positions on three piers.</div> <div>Coal Loading Towers (Piers 5 & 6 Lambert Point): Three towers of 17,690.4 t (19,500 s ton) per hr total capacity with conveyors and railroad car dumpers.</div> <div>Grain Elevator (adjacent to Piers A & B Sewell's Point): Unloading rate of railroad hopper cars, trucks and barges of 422.9 m³ (12,000 bu) per hr. Equipment includes two driers with capacity 141.0 m³ (4000 bu) per hr.</div> <div>Other Equipment: There are naval facilities for loading and off-loading aircraft at piers or by barge.</div> | <div>Covered Storage: 178,553.8 m² (1,922,000 ft²) on or adjacent to piers, including 37,160 m² (400,000 ft²) refrigerated storage, backed by 157,001 m² (1,690,000 ft²) warehousing. Included are customs bonded stores, fumigation plants, meat inspection and food packing plants.</div> <div>Open Storage: 4737.9 m² (51,000 ft²) on piers plus 11,612.5 m² (125,000 ft²) container park space.</div> <div>Oil Storage: 3,974,700 hectoliters (2,500,000 bbl) in 58 tanks.</div> <div>Grain Storage: 116,292 m³ (3,300,000 bu).</div> | <div>Railroads: The Norfolk and Western Railroad and the Norfolk and Portsmouth Belt Line Railroad serve the dock areas and connect via Suffolk, Petersburg and Richmond to within 3.2 km (2 mi) of Fort A. P. Hill.</div> <div>Roads: Road routing is via Interstate Highway 64, the Hampton Roads bridge/tunnel, Interstate Highway 95 and State Highway 207.</div> <div>Air: Naval Air Station Norfolk is less than 3.2 km (2 mi) from the dockside via local roads. Norfolk International Airport lies 8.1 km (5 mi) from the port via Interstate Highway 64 and local roads.</div> | <div>Future plans for the Norfolk International Terminals include completion of a third berth, modifications to the finger piers to accommodate LASH barges, the aquisition of a 45.4 t (50 s ton) mobile crane and further warehouses. At Lambert Point docks, a further pier is to be constructed and two 113.4 t (125 s ton) gantry cranes provided at piers. Open storage space is to be enlarged at Sewell's Point.</div> |

C. PORTS (Continued)

| NAME AND LOCATION | TYPE AND GENERAL CONDITION | FACTORS LIMITING LARGEST VESSEL | HYDROLOGIC CONDITIONS AND UNUSUAL GEOPHYSICAL CONDITIONS | PIERS AND WHARVES | MECHANICAL HANDLING FACILITIES | STORAGE FACILITIES | CLEARANCE FACILITIES | REMARKS |
|--|--|---|--|---|---|---|---|---|
| Name: Port of Portsmouth (including Naval Weapons Station St. Juliens Creek) Location: 36° 50' N 76° 20' W | Type: Improved natural river port Condition: Excellent Cargo Handling: See Port of Norfolk | Approaches: a. Hampton Roads to Junction Eastern and Southern Branches Elizabeth River Minimum depth: 12.2 m (40 ft) Minimum width: 228.6 m (750 ft) b. Southern Branch to Paradise Creek Minimum depth: 12.2 m (40 ft) Minimum width: 137.2 m (450 ft) c. Southern Branch from Paradise Creek to St. Juliens Creek Minimum depth: 10.7 m (35 ft) Minimum width: 76.2 m (250 ft) Turning basin at mouth of St. Juliens Creek: depth 10.7 m (35 ft) width 121.9 m (400 ft) length 243.9 m (800 ft) Anchorages (Pinners Point): Minimum depth: 3.7 m (12 ft) Alongside Berths: Minimum depth: 6.1 m (20 ft) Maximum length: 527.3 m (1730 ft) | Tidal Ranges: Mean tidal range is 0.8 m (2.7 ft) Extreme range 1.0 m (3.4 ft) | Number: 10 Uses: Break-bulk, containerized and roll-on/roll-off general cargo, petroleum products, grain, tobacco, foodstuff, automobiles and lumber. Naval piers handle ammunition and components, chemical warfare materials, charges, grenades, small arms ammunition, pyrotechnics and bombs. Types of Construction: Concrete or steel piles and decks. Concrete bulkheads and timber fender systems. Number of Berths: 12 (including two oil tanker berths), Lengths 24.7 m (81 ft) to 527.3 m (1730 ft) Depths alongside 6.1 m (20 ft) to 11.6 m (38 ft) Height of decks 1.4 m (4.5 ft) to 3.7 m (12 ft) (above MLLW) | Cranes: One 99.8 t (100 s ton) gantry crane. Four 33.2 t (30 l ton) container cranes. Oil Berth Hoses (BP pier): Four 203 mm (8 in) Five 152.4 mm (6 in) Electrically operated hose crane at mooring platforms. Grain Elevator (entrance Paradise Creek): Storage and loading spouts with maximum loading rate of 1633.0 t (1800 s ton) per hr. Molasses Bulk Storage (entrance Paradise Creek): One 304.8 mm (12 in) pipeline and handling davit. Other Equipment: Six container transporters, fork-lift trucks, tractors and trailers, ammunition hoists and other types of mechanized and portable yard equipment. Naval Weapons Station St. Juliens Creek has peacetime ammunition handling rate of 544.3 t (600 s ton) per eight hr day. | Covered Storage: 12,077 m ² (130,000 ft ²) at piers backed by 27,871 m ² (300,000 ft ²) general and refrigerated warehouse storage, including meat inspection facility and fumigation chambers. Open Storage: 121,424 m ² (1,307,000 ft ²) for refrigerated and other containers and automobiles. Oil Storage: 651,850.8 hectoliters (410,000 bbl) in 16 tanks. Grain Storage: 13,215 m ³ (375,000 bu) in concrete silos. Molasses Storage: 7,949,130 liters (2,100,000 gal) in three tanks. | Railroads: The Norfolk and Western Railway, the Norfolk and Portsmouth Belt Line Railroad and the Seaboard Coastline Railroad all serve the port areas and connect via Suffolk, Petersburg and Richmond to within 3.2 km (2 mi) of Fort A. P. Hill. Roads: Routing is via U. S. Highway 460 and Petersburg Interstate Highway 95 and State Highway 207. | Expansion to 1980 includes further open storage for the Portsmouth Marine Terminal and construction of further warehouse capacity. No information is included in this summary on the ship building and repair facility of the Norfolk Naval Shipyard, Portsmouth. |
| Name: Port of Richmond (deep water terminal) Location: 37° 27' N 77° 26' W | Type: Natural river port Condition: Good Cargo Handling: 140,752.6 t (155,154 s ton) handled in 1975. Present capacity, 151,868 t (167,400 s ton). | Approaches: Minimum depth: 7.6 m (25 ft) Minimum width: a. James River mouth to Hopewell 91.4 m (300 ft) b. Hopewell to Richmond 61.0 m (200 ft) Anchorages: Hampton Roads anchorages, before entering James River. Alongside Berths: Minimum depth: 7.6 m (25 ft) Maximum length: 381 m (1250 ft) Turning basin at Richmond 213.4 m (700 ft) by 487.7 m (1600 ft) | Tidal Ranges: Mean tidal range is 0.8 m (2.5 ft) Water level can be affected by heavy rain run-off into river. | Number: One Uses: Break-bulk handling of iron and steel scrap, paper and paperboard, newsprint paper, tobacco and general cargo. Export of livestock. Type of Construction: Concrete deck with timber and concrete piles and timber fender system. Number of Berths: Two Length 190.5 m (625 ft) ea. Depth alongside 7.6 m (25 ft) Height of deck 6.7 m (22 ft) (above MLLW) | Cranes (serving both berths): One 59.0 t (65 s ton), one 32.7 t (36 s ton) and one 15.9 t (175 s ton) catapillar crane. One 9.1 t (10 s ton) traveling crane. Locomotive: One locomotive for handling rail cars within terminal area. Livestock Loading: Livestock pens, loading chute and way pen for maximum of 700 cattle. Other Equipment: Twelve truck docks, fork-lift trucks and other types of portable yard equipment. | Covered Storage: 23,132.1 m ² (249,000 ft ²) Open Storage: 303,504.3 m ² (3,267,000 ft ²) | Railroads: The Seaboard Coastline Railroad serves the wharf with direct connection to Richmond and to within 3.2 km (2 mi) of Fort A. P. Hill. Roads: Road routing is via Interstate Highway 95 which passes to rear of port area and State Highway 207. Air: Richard Evelyn Byrd International Airport is situated 4.0 km (2.5 mi) from the port via local routing. | The 7.6 m (25 ft) river channel is to be maintained in the foreseeable future but some easing of the bends in the river approaches is currently under investigation. The cargo projection is a growth to over 181,440 t (200,000 s ton) by 1986 and the building of a third berth and an additional 9290 m ² (100,000 ft ²) covered storage space are planned. |
| Name: Port of Yorktown (Naval Supply Center Fuel Division) Location: 37° 13' N 76° 28' W | Type: River port Condition: Good Cargo Handling: Fuel terminal | Approaches: Minimum depth: 10.7 m (35 ft) Minimum width: 91.4 m (300 ft) Anchorages: Naval anchorage as for Naval Weapons Station. Minimum depth: 6.1 m (20 ft) Alongside Berths: Minimum depth: 10.7 m (35 ft) Maximum length: 179.8 m (590 ft) | Tidal Ranges: Meantidal range 0.8 m (2.5 ft) | Number: One Use: Oil fuel and water replenishment. Type of Construction: Part timber, part concrete. Number of Berths: One/Two Length 179.8 m (590 ft) (total) Depth alongside 10.7 m (35 ft) Height of deck 2.4 m (8 ft) (above MLLW) | Fuel and Water Replenishment Hoses: One 355.6 mm (14 in) jet fuel (JP4) One 457.2 mm (18 in) jet fuel (JP5) One 457.2 mm (18 in) naval fuel oil Forty 152.4 mm (6 in) fuel loading ports. One 304.8 mm (12 in) water One 203.2 mm (8 in) water | Covered Storage: Naval fuel and oil storage. | Railroads: The Chesapeake and Ohio Railroad runs to within 12.9 km (8 mi) of the terminal and via Williamsburg and Richmond to 3.2 km (2 mi) from Fort A. P. Hill. Roads: Road routing is via State Highway 64 to Richmond, thence by Interstate 95 and State Highway 207. | |
| Name: Port of Yorktown (Naval Weapons Station) Location: 37° 15' N 76° 33' W | Type: Improved river port Condition: Good Cargo Handling: Equipped to handle and store naval weapons and ammunition. | Approaches: Minimum depth: 10.7 m (35 ft) Minimum width: 91.4 m (300 ft) (at Gloucester Point road bridge) Anchorages: Naval anchorage south of Thimble Shoal Channel before entering York River. Minimum depth: 6.1 m (20 ft) Alongside Berths: Minimum depth: 11.3 m (37 ft) Maximum length: 691.9 m (2270 ft) | Tidal Ranges: Mean tidal range 0.8 m (2.5 ft) | Number: Two Uses: Movement of naval weapons and ammunition. Types of Construction: Concrete piles and decks. Number of Berths: Four Lengths 228.6 m (750 ft) to 691.9 m (2270 ft) Depth alongside 11.3 m (37 ft) at all berths. Height of decks 3.4 m (11 ft) (above MLLW) | Ammunition hoists, tractors, trailers and flat beds. Average peacetime handling rate of weapons stores 228.6 t (252 s ton) per eight hr day. | Weapon and ammunition storage only. | Railroads: The Chesapeake and Ohio Railroad runs to within 9.7 km (6 mi), via Williamsburg. A direct link via Richmond from Williamsburg runs to within 3.2 km (2 mi) of Fort A. P. Hill. Roads: Road routing is via Colonial Parkway, Interstate 64 Interstate 95 from Richmond and State Highway 207. | |
| 1 t : l ton : s ton : | metric ton long ton short ton | | | | | | | |
| 2 MLLW : | Mean Lower Low Water | | | | | | | |
| 3 LASH : | Lighter-Aboard-Ship | | | | | | | |

FORT A. P. HILL, VIRGINIA
TERRAIN ANALYSIS



OFF-POST FEATURES

- Urban Area
- Airfield
- Port
- Cantonment Area

IV. LIST OF SOURCES

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